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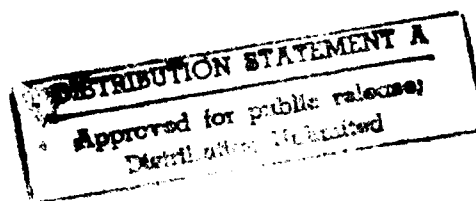
November 1992

# The Impacts of Compatible Land Use at Fort Bragg-Pope Air Force Base

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## **Executive Summary**

### **THE IMPACTS OF COMPATIBLE LAND USE AT FORT BRAGG – POPE AIR FORCE BASE**

Fort Bragg and Pope Air Force Base (AFB) form a major military complex that dominates the Fayetteville, N.C., region. Together, the bases constitute a significant portion of the regional economy, directly accounting for nearly one out of every four jobs, and generating about 21 percent of regional earnings.

The combat readiness of these bases requires the performance of intensive airfield training exercises consisting of fixed- and rotary-wing aircraft overflights, live-fire artillery and armor training, and low level aircraft overflights. The Fort Bragg – Pope AFB complex maintains a fast operating tempo for both daytime and nighttime training. Fort Bragg is one of the Army's "Flagship Installations"; it played a major role in the Gulf War.

In recent years, there has been increased local public interest in the noise and safety impacts that military training exercises can have on local communities in the vicinity of the bases. In 1989, a joint land use task force of local government officials, DoD representatives, and local citizens was formed to address the noise and safety issues in the Fort Bragg area. In 1991, the task force completed the *Joint Compatible Land Use Policy Study*. That study led to a number of report recommendations on how local land use policies could be made "compatible" with military operations and vice versa. One of the key policy implications of the recommendations was that local governments should adopt zoning and other land use restrictions to limit the number of new residential units being built in areas affected by military noise and safety exposures.

Any decision to impose land use restrictions involves a complex set of issues. The key issue involves the benefits and costs of imposing those restrictions on Fort Bragg – Pope AFB, to the local governments, and to the local landowners involved. Elected and appointed officials are responsible for ensuring the public health and safety of the communities they represent. They must also consider the costs

associated with zoning because it affects future land development, property values, and tax revenues.

Fort Bragg – Pope AFB benefits from compatible land use that ensures its ability to conduct training exercises in an effective and efficient manner; however, the military wishes to remain a cooperative member of the community while still achieving their mission. The lack of compatible land use could lead the military to alter training operations or to incur the cost of training personnel elsewhere. In the extreme, land use restrictions on the military could require a transfer of missions to other installations, which could have a disastrous effect on the region's economy.

Faced with compatible land use issues, the joint land use task force at Fort Bragg decided that it should fully assess the costs and benefits before adopting any compatible land use recommendations. The DoD's Office of Economic Adjustment tasked the Logistics Management Institute to examine the fiscal implications associated with compatible land use for the four counties in the areas most affected by Fort Bragg's military operations: Cumberland, Harnett, Hoke, and Moore.

We project that population in the four-county area will increase at a stable rate of approximately 1 percent annually over the next 2 decades. Most of this growth is expected to come from normal demographic increases, with some growth coming from immigration. This growth will generate a demand for the construction of 58,000 new housing units and additional commercial facilities by the year 2010.

The fiscal impacts of adopting compatible land uses are negligible, largely because substantial amounts of land are available for development outside the areas affected by proposed restrictions. Local jurisdictions have the ability to direct intensive development away from areas affected by military operations without incurring any significant costs. However, military authorities do not have the same flexibility. In most cases, military operations cannot be moved from their existing training sites without incurring additional costs. If some degree of compatible land use is not adopted in the four counties under study, then future land development is likely to alter military operations and could ultimately threaten the viability of Fort Bragg – Pope AFB as a major training and "force-projection" complex.

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## CHAPTER 1

### INTRODUCTION AND BACKGROUND

The Fort Bragg–Pope Air Force Base (AFB) complex is a major military installation that dominates the Fayetteville, N.C., region. In recent years, there has been increased public interest in the noise and safety impacts that military training exercises can have on local communities in the vicinity of the bases. The Fort Bragg–Pope AFB complex has a high operating tempo for both daytime and nighttime training exercises. The combat readiness of these bases requires intensive training exercises, including airfield operations of fixed- and rotary-wing aircraft, live-fire artillery and armor training, and low level overflights.

While the most severe noise and safety exposures from training exercises are confined to on-base training areas, there are also significant areas affected off the base. Approximately 7,000 dwellings (i.e. homes) and over 353,470 acres of off-base realty are exposed to military-generated noise or accident exposure levels that exceed the guidelines recommended by DoD and the Federal Aviation Administration (FAA). Given current zoning practices, an additional 13,000 housing units are expected to be built in these affected areas over the course of the next 20 years.

In 1989, a joint task force of local government officials, DoD representatives, and local citizens was formed to address the land use issues. In 1991, the task force developed a *Joint Compatible Land Use Policy Study* (JCLUS).<sup>1</sup> The study included a number of recommendations on how present and future local land use policies could be made compatible with military operations. One of the key implications of those recommendations was that local governments should adopt zoning and other land use restrictions to limit the number of new housing units being built in areas affected by military noise and safety exposures.

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<sup>1</sup>The JCLUS refers specifically to two reports: *Fort Bragg–Pope Air Force Base Impact Assessment: Population, Housing, Fiscal, Economic Land Use*, Department of City and Regional Planning, University of North Carolina at Chapel Hill, N.C., September 1990, and *Joint Compatible Land Use Policy: Recommendations to Military Jurisdictions and Local Governments in the Fort Bragg Region*, Center for Urban and Regional Studies, University of North Carolina at Chapel Hill, N.C., January 1991.

The decision to impose land use restrictions typically involves a complex set of issues, each with corresponding benefits and costs. Elected and appointed local area officials are responsible for one such issue: ensuring the public health and safety of the communities they represent. These officials have an interest in minimizing the level of accident and noise exposure associated with military operations, and they have certain powers to protect the public from such problems by implementing compatible use zoning and other land use controls. Such compatible land use enhances the mission capability of military installations, which are a critical element of the Fayetteville regional economy. Military bases benefit from the implementation of compatible land use that minimizes constraints on base operations, thereby avoiding the increased operating and training costs associated with imposing their own limitations on air operations and other training exercises.

The costs associated with any land use zoning are primarily "opportunity" costs. Both the private and the public sectors forgo the opportunity to develop land more intensively when that land is burdened by noise and risk. In the case of compatible land use zoning, this typically involves reducing the density of new residential development in affected areas. Determining the costs and benefits of such land use requires considerable effort. Typically, such changes are viewed as a cost to local communities. However, there are several factors that must be considered to assess the costs and benefits of lower density zoning. For instance, there is no opportunity cost to local communities of imposing lower density zoning if there is likely to be a low demand for land development from the start. Likewise, there is essentially no tax revenue lost if development is shifted to other comparable areas within the same jurisdiction. It also must be recognized that significantly incompatible land use can lead to higher costs to the military. If severe enough, incompatible land use can lead to reduced base activity; create the need to periodically move troops and equipment to other training bases; or in extreme situations, could lead to the closure of the installation. In the absence of a thorough understanding of the specific issues, it is difficult to determine the costs associated with adopting compatible land use policies.

Faced with these issues, the joint land use task force at Fort Bragg decided that prior to adopting the recommendations of the JCLUS, there was a need to fully assess the costs and benefits associated with those recommendations. DoD's Office of Economic Adjustment (OEA) tasked the Logistics Management Institute (LMI) to examine the fiscal implications of adopting those recommendations.

To accomplish this task, we first developed implementation scenarios related to the specific land use recommendations discussed in the JCLUS. The scenarios represent incremental implementation levels ranging from adopting no land use recommendations (the baseline case, or status quo) to adopting all of the recommendations. The following four counties were addressed in the study: Cumberland, Harnett, Hoke, and Moore. For each county, we examined the projected growth levels and demand for land use through the year 2010. Based on projected growth levels in the baseline case, we then estimated the effects of applying compatible land use measures to all areas affected by military operations. Our final step was to calculate the fiscal effect associated with each scenario on the local communities and on the military.

The remainder of this report describes the significance of the military's impact on the local area economy (Chapter 2), the current and future land uses in the region (Chapter 3), the impacts of military operations on local land use (Chapter 4), the impacts of compatible future land use on military operations (Chapter 5), the fiscal impacts of compatible land use on local communities (Chapter 6), and LMI's findings and conclusions (Chapter 7). The appendices contain tables and documentation that support the information given in the main text of the report.

## CHAPTER 2

### THE IMPACT OF FORT BRAGG – POPE AFB ON THE FOUR-COUNTY REGION

#### IMPORTANCE TO THE LOCAL AREA ECONOMY

The importance of the military to the economy of the four-county study area is shown in Table 2-1.

**TABLE 2-1**  
**FORT BRAGG – POPE AFB SHARE OF FOUR-COUNTY ECONOMY**

	Fort Bragg military	Fort Bragg civilians	All other	Four- county area	Fort Bragg percentage of total
Population	104,129	8,379	311,749	424,257	26.5
Jobs	43,358	4,200	150,644	198,202	24.0
Earnings (\$ millions)	858.2	119.4	3,549.9	4,527.5	21.6

*Source:* U.S. Department of Commerce, Bureau of Economic Analysis, 1990 Census of Population, Fort Bragg – Pope AFB reports.

As shown in Table 2-1, Fort Bragg and Pope AFB account for nearly one out of every four direct jobs in the four counties being analyzed. Over 47,500 military and civilian on-base personnel earn \$978 million. These payrolls generate an additional 13,300 indirect and secondary jobs in the area. The additional jobs created are estimated by applying an employment multiplier of 1.28. That is, every direct job associated with the military installations generates 0.28 jobs in the community; therefore, Fort Bragg and Pope AFB account for a total of close to 61,000 jobs or over 3 of every 10 jobs in the area. Additional local jobs also result from base purchases by the military installations. The percentage of total employment attributable to the two bases is the highest in Cumberland County. No other area employer even comes close to providing as many jobs and earnings as the two military installations.

In addition to employment associated with direct base activities, an estimated 16,000 retired military households and over 30,000 military retired personnel and their dependents reside within a 40-mile radius of the bases. These households have average annual earnings estimated at over \$20,000. The presence of base facilities, including the hospital, commissary, and post exchange (PX) is the major reason for the large number of military retirees remaining in the Cumberland County area.

In Cumberland County, earnings of active military households are estimated to be 90 percent of the average area earnings. In Harnett and Hoke counties, average military earnings actually exceed average civilian earnings.

### **IMPORTANCE OF FORT BRAGG – POPE AFB IN THE FUTURE**

Fort Bragg – Pope AFB will continue to be critical to the area economy during the next 2 decades. The two bases not only account for 3 out of every 10 jobs but also provide the area with exceptional economic stability. Active military personnel, on-base civilians, and retirees are paid regardless of local or regional economic conditions.<sup>1</sup> Fort Bragg – Pope AFB is considered one of the military's "Flagship Installations." The units assigned there played a major role in the Gulf War and will continue to be called upon to respond immediately in the event of future conflicts. As such, Fort Bragg – Pope AFB is not only crucial to the local economy, it also plays a key role in national defense.

Continuous training exercises are essential to maintain troop readiness at the levels necessary to be combat-ready. This fast operations tempo requires a substantial number of training flights, live artillery firing, and low-level paradrops. These training missions create potential hazards and produce considerable noise impacts within specified areas. The levels of training hazards and noise exposures were addressed in detail in the JCLUS. The primary focus of our report is on the analysis the off-base impacts of military operations on the local communities and determining what measures should be taken to ensure compatible development.

In structuring our analysis, we utilized the previously completed studies on land use compatibility in the Fort Bragg region, specifically the JCLUS, which identified and measured the areas affected by the noise and safety hazards associated

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<sup>1</sup>No known prospects for manufacturing or other industries could replace the economic contribution of the two military bases. Were activities and personnel at the bases to be restricted, such curtailment would undoubtedly have a substantial, adverse impact on the local economy.

with military operations. That study identified four distinct types of impacts, including the following: the impacts associated with the accident-potential zones of military airfield operations, primarily takeoffs and landings; the noise impacts associated with aircraft and artillery; the impacts on local development associated with building height restrictions; and the noise and safety impacts associated with the low level overflight areas leading into paradrop zones.

The remainder of this report focuses on the analysis of those off-base geographic areas affected by military operations, the local fiscal impacts, and the military costs of adopting compatible land use measures.

## **CHAPTER 3**

### **CURRENT AND FUTURE LAND USES IN THE REGION**

#### **THE FOUR-COUNTY STUDY AREA**

The four-county study area consists of Cumberland, the most urban county in the region; and Harnett, Hoke, and Moore counties, which are predominantly rural. Cumberland County has a land area of 653 square miles, Harnett 595 square miles, Moore 698 square miles, and Hoke, the smallest, 391 square miles.<sup>1</sup> Population density varies from 420 persons per square mile in Cumberland County to only 58 persons per square mile in Hoke County. The largest city in the area, Fayetteville, is located in Cumberland County. Almost two-thirds of the area population is concentrated in Cumberland County. Hoke, the most rural county, has only 21,000 residents. All of the counties have been growing at roughly the same rate as the State of North Carolina.

Given the low population density, it is not surprising that most of the land area in the four counties is unimproved. Some of the open land is used for agriculture; the balance is essentially idle. However, not all unimproved land is suitable for development. Steep slopes, swamps, recreation areas, and areas with poor drainage limit the development potential. Other areas are a considerable distance from road networks; they are unlikely to develop until the road systems are expanded.

We calculated future land use patterns from estimated new housing demand levels and related nonresidential development and infrastructure needs required to support population and housing growth. The process began by reviewing state estimates of future population growth for each county.

Population projections for each county are based on estimates provided by the State of North Carolina. The state methodology is based primarily on historical trends and the demographic characteristics of the county populations. The state anticipated population growth during the 1990s is projected to be about the same as

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<sup>1</sup>The total square miles do not include areas covered by water.



during the 1980s, with slower growth between 2000 and 2010. The four-county region is expected to grow by 21 percent during the next 2 decades or slightly over 1 percent a year.

Most of the population growth is expected to occur from natural increase (births over deaths), with the balance attributed to net immigration from other areas within and outside North Carolina. This is consistent with the regional pattern observed during the past 2 decades. As shown in Table 3-1, growth in the four-county area is projected to be somewhat faster than in the balance of North Carolina.

**TABLE 3-1**  
**FOUR-COUNTY POPULATION GROWTH PROJECTIONS, 1990 - 2010**

Area	1980	1990	Percentage growth	2010 (projected)	Percentage growth 1990 - 2010
Cumberland	247,160	274,566	11.1	328,052	19.5
Harnett	59,570	67,822	13.9	84,578	24.7
Hoke	20,383	22,856	12.1	27,529	20.4
Moore	50,505	59,013	16.8	71,356	20.9
Four-county area	377,618	424,257	12.4	511,515	20.6
North Carolina	5,880,950	6,628,637	12.7	7,739,000	16.8

Source: State of North Carolina.

These population estimates were then used to forecast the volume of new households that will form during the next 20 years. New housing demand also includes replacement for existing housing units that will be taken out of the housing stock (e.g., destroyed by fire, abandoned, or converted to other uses).

The physical location of new housing within each locality is primarily based upon data provided by local planners. In Cumberland County, planning office staff members presented projections showing the location of new housing (at the census tract and planning district levels). The other three counties selected areas where most new growth was expected to take place. Factors affecting the distribution of new housing units are the location's proximity to urbanized areas (of Cumberland

County) road networks, good soil conditions; and the direction of recent growth. In addition to land for housing, additional acreage was allocated for retail and other commercial development, roads, and public facilities such as schools that will be associated with new residential development. We also identified areas expected to only grow slowly. Most new county housing was allocated to growth areas designated by the local planners. The balance of new housing was distributed to other areas of the county where growth was expected to be less intense.

## **ELEMENTS OF GROWTH**

### **Military**

This analysis assumes that the number of military personnel and on-base civilian personnel will remain stable during the next 20 years. This is consistent with recent experience. Military employment during the 1980s remained essentially stable, increasing by only 2 percent during the entire decade. Consolidation of military activities could add small numbers of additional personnel to Fort Bragg – Pope AFB. However, such additions would be very modest in number.

### **Retirees – Military**

The number of military retiree households within a 40-mile radius of the installations is about 16,000. This number may increase during the next 2 decades for two reasons. First, the number of military personnel retiring early will increase as a result of the military downsizing nationwide. Secondly, the four-county area is particularly attractive for military retirees because the local cost of living is relatively low. In addition to the overall low cost of living, there are on-base facilities, including a hospital, a PX, and a commissary. The availability of these facilities increases the purchasing power of retirees by providing free medical services and lower-than-average prices for many retail goods.

### **Retirees – Civilian**

The number of civilian retirees in the four-county area is expected to grow more rapidly than the general population. In part, this reflects a general aging of the area's and the nation's population because of an increased life expectancy. Again, the cost of living in the area is low and local housing developers cater to retired households. For instance, Moore County has a number of well-known retirement communities such as Pinehurst and Southern Pines that cater specifically to affluent

retirees. These factors, combined with the area's mild climate, should attract immigration of additional elderly to the region.

### Other Growth Factors – Employment and Income Expansion

As shown in Table 3-2, private-sector jobs expanded at rates slightly above the U.S. average in Harnett and Hoke counties and substantially above average in Cumberland and Moore counties during the 1980s. The data suggest that some of the employment growth in these two counties was attributable to persons working in Cumberland and Moore, but living in Harnett and Hoke (and commuting to work).

**TABLE 3-2**  
**FULL- AND PART-TIME EMPLOYMENT GROWTH IN IMPACT AREAS**

Area	Private jobs			Public jobs		
	1980	1990	Percentage increase	1980	1990	Percentage increase
Harnett	14,731	19,045	29.2	2,911	3,080	5.8
Hoke	4,565	5,831	27.7	1,373	1,551	13.0
Cumberland	55,856	79,461	42.3	65,730	69,978 <sup>a</sup>	6.5
Moore	20,125	28,331	40.8	2,955	3,507	18.7
U.S. (millions)	89.6	112.2	25.2	18.8	20.7	10.1

Source: U.S. Department of Commerce, Bureau of Economic Analysis computer runs, April 1991.

<sup>a</sup> Military personnel growth was from 45,109 in 1980 to 46,040 in 1990, or by 931 persons.

Manufacturing jobs account for a larger share of all jobs in the region (with the exception of Cumberland County) than the U.S. standard. However, with the exception of Moore County, job growth in manufacturing has been very modest (see Table 3-3). Slow growth in manufacturing jobs is consistent with the national pattern.

Historically, per capita personal income in the four counties has been considerably below the national mean, with the lowest income experienced in rural Hoke County. During the 1980s, per capita income grew rapidly in Moore County, and by 1989, came close to the U.S. average (see Table 3-4). Cumberland County also

TABLE 3-3

## JOBS IN MANUFACTURING, INCREASE BETWEEN 1980 AND 1989

Area	1980	1989	Percentage change	Percentage manufacturing of all private-sector jobs
Cumberland	11,441	12,277	7.3	15.4
Harnett	4,928	5,015	1.8	26.3
Hoke	3,007	3,206	6.6	64.9
Moore	6,115	7,239	18.4	25.6
U.S. (millions)	18.8	19.9	5.9	17.8

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

had above-average increases, as did Harnett. Only Hoke County lagged the nation in income growth. The income data imply that the rapid rise in Moore County is attributable to the immigration of relatively affluent retired persons as well as to rapid job growth. Migrants to Hoke and Harnett counties are likely to have income levels close to the average of current residents in these counties.

TABLE 3-4

## ANNUAL PER CAPITA INCOME, BY COUNTY

Area	1980	1989	Percentage increase
Cumberland	\$6,997	\$13,576	94.0
Harnett	6,159	11,120	80.5
Hoke	5,202	9,091	74.8
Moore	8,571	17,306	101.9
U.S.	9,919	17,592	77.4

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Based on recent trends, the region is likely to have sufficient job growth to attract modest levels of immigration. Most future employment growth will be concentrated in Cumberland and Moore counties. Because jobs in Harnett and Hoke

are concentrated in low-wage manufacturing, including apparel goods production particularly vulnerable to foreign competition, manufacturing employment prospects are limited unless these counties can diversify their economic base. Immigration to these counties will be due primarily to a spillover from Cumberland County rather than rapid growth in employment opportunities within these counties themselves.

Moore County growth will depend principally on the number of retired households attracted to the several well-established communities with large numbers of elderly persons. Because military strength is expected to be stable and civilian sectors experience growth, the proportion of military presence in the Cumberland County population is expected to decline steadily over the next 2 decades.

### **Household Growth Projections**

In 1990, Cumberland County had 91,501 households, or 62 percent of the four-county total. The average household size in 1990 was largest in Hoke County (2.92 persons per household), and smallest in Moore County (2.43 persons per household). The small size in Moore County is attributable to its sizable retirement population. Future household formation is expected to exceed population growth because the average household size is expected to fall, a pattern observed during the last 4 decades. However, the rate of decline is expected to slow. The projected household size in Cumberland County is expected to be 2.60 in the year 2010, while Moore County is projected to decline to 2.25 persons per household.<sup>2</sup>

Projections of future household size are crucial in estimating housing demand because each additional household formation results in the need for an additional housing unit. Thus, if the average household size decline more rapidly than projected (e.g., because more households of retired people move to the region), housing demand rises. Concurrently, if the number of households remains stable, housing demand declines.

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<sup>2</sup>The projected household size was determined by applying the trend projected by the Bureau of the Census for national household size to current household size for each county.

## **DEMAND FOR UNIMPROVED LAND IN THE FOUR-COUNTY AREA**

### **Components of Demand for Land**

The largest component of demand for unimproved land is attributable to the housing needs of new population. Between 1990 and 2010, the number of households is expected to grow by 26,555 units in Cumberland County, by 8,521 units in Harnett County, by 7,298 units in Moore County, and by 2,418 units in Hoke County.

Reductions in existing housing stock are an additional source of demand for unimproved land. Based on Bureau of the Census studies, up to 1 percent of all housing units each year are destroyed by fire, condemned, converted to other uses, or otherwise no longer used for housing. However, annually we assume that only 0.3 percent of all 1990 replacement housing will require additional land, because the majority of replacement units are expected to be built on previously developed sites.

The third component of demand for residential land stems from additional units built in excess of demand. We assume the existence of a 7 percent housing vacancy rate in 2010, the same observed in 1990 – a rate often found around military bases.

Typically, new residential subdivisions are followed by associated land development. That is, shopping centers, office buildings, and schools are built in close proximity to new housing to provide goods and services to the new population. However, these nonresidential facilities are used in a less land-intensive manner than are residential uses. We assume that for every 7 acres of residential development, an additional acre of other nonresidential development will occur in areas of moderate-density housing. In low-density residential areas, an additional acre of nonresidential development will be needed for every 10 acres of residential development. These assumptions are based upon the existing ratios of residential to commercial land use.

Projected new residential units for each county for the 1990–2010 time frame are shown in Table 3-5. Total housing demand for the four counties is projected to be 58,341 units, or about 3,000 units each year. The majority of new housing is projected to be built in Cumberland County.

TABLE 3-5

## PROJECTED TOTAL NEW RESIDENTIAL CONSTRUCTION, 1990 – 2010

County	New households	Housing stock reduction	Vacant housing stock <sup>a</sup>	Total	Total new construction per annum (average)
Cumberland	26,555	5,902	1,859	34,316	1,716
Harnett	8,521	2,231	596	11,348	567
Hoke	2,418	640	169	3,227	161
Moore	7,298	1,641	511	9,450	472
Total	44,792	10,414	3,135	58,341	2,916

<sup>a</sup> Seven percent of new households.

## Acreage Demand at the County Level

The number of dwelling units per gross total acres in the four-county area was very low in 1990. As shown in Table 3-6, there was about one dwelling unit for every 4 acres in Cumberland and about one unit for every 14 acres in Harnett County. However, these low densities can be misleading because most of the land is currently being used for agriculture or another purpose; that land is not likely to be used for residential housing.

TABLE 3-6

## HOUSING DENSITY – 1990

County	Number of acres	Number of dwelling units	Dwelling units per acre
Cumberland	418,003	91,410	0.235
Harnett	380,800	27,876	0.073
Hoke	250,368	7,194	0.032
Moore	447,232	27,358	0.061

Total acreage of each county is adjusted downward to take into account the fact that not all land can be developed because of steep terrain and other factors. It is estimated that 85 percent of the available land is developable in most planning districts within Cumberland County. In other counties, developable land is computed on the basis of specific area characteristics in each growth area. The percentage of developable land typically varies from 75 to 90 percent of gross acreage.

Residential acreage demand is based on projected density (units per acre) of housing in each planning district or growth area. It is usually assumed that new units (grouped by value) will have the same density as existing units.

Acreage per dwelling unit is highest (one to five acres per unit) in areas lacking water and sewerage. In areas with these utilities, the density of existing housing units is usually used to determine new housing density. For example, in the City of Fayetteville, it is assumed that low-priced housing will be built at eight units per acre. This high density is attributable to the fact that most lower priced units in the city are apartments or mobile home parks. However, in a secondary growth area outside Fayetteville but within Cumberland County, average density is projected to be one unit per acre.

#### **Distribution of Projected Housing Units and Demand for Land – County Level**

As shown in Table 3-7, total acreage in use for housing, commercial development, and other land uses (including infrastructure) in 1990 comprised only 15 percent of total developable land in Cumberland County and 10 percent of total developable land in the four-county area. Between 1990 and 2010, a total of about 38,000 additional acres will be required for all development activities. This represents a 34 percent increase in required acres from the 1990 level. The added acreage is projected to accommodate over 58,000 new housing units as well as other land development associated with a new population, such as retail stores, schools, and roads. By 2010, 13.4 percent of all land in the four counties will be developed, still less than one out of every seven acres. Taking into account that for various reasons not all the land can be developed, very substantial quantities of developable land will remain available in the four counties.



**TABLE 3-7****ACREAGE CURRENTLY IN USE AND REQUIRED BETWEEN 1990 AND 2010**

<b>County</b>	<b>Total developable acres</b>	<b>Acres in use</b>	<b>Acres available for development</b>	<b>Number of dwelling units 1990 – 2010</b>	<b>Developable acres required 1990 – 2010</b>	<b>Available acres minus acres required</b>
Cumberland	325,262	48,490	276,772	34,316	14,146	262,626
Harnett	323,685	27,876	295,809	11,348	11,905	283,904
Hoke	102,607	11,868	90,739	3,227	2,531	88,208
Moore	375,832	24,665	351,167	9,450	9,326	341,841
Total	1,127,386	112,899	1,014,487	58,341	37,908	976,579

## **CHAPTER 4**

### **THE IMPACTS OF MILITARY OPERATIONS ON LOCAL LAND USE**

#### **INTRODUCTION**

The total off-base land area affected by military operations is about 353,470 acres and represents about 24 percent of the total 1.5 million acres in the four-county area. In nearly all county growth areas, we found that there is enough developable land to avoid any negative effects from adopting compatible land use measures or lowering housing density. In all but one case, adopting compatible land use would not affect future development enough to displace or curtail projected growth in the county.

#### **Technical Approach**

In Chapter 3, we described the demand for developable land in the four-county area based on expected population growth to the year 2010. We then identified the areas in each county that are affected by military activities such as airfield operations, low-level overflight missions, or artillery noise. Next, we identified the areas where future development and military operations overlapped, and we examined the likely effects of changing the existing land use patterns so that they become compatible with military operations for each county growth area. To estimate the effects of changing land use on county growth, we measured the effects over a range of five land use scenarios: from the baseline, scenario 1, where no additional compatible land use measures are imposed, through scenario 5, which assumes comprehensive land use measures. A more detailed description of the methodologies used in this analysis is included in the appendices to this report.

#### **Areas Affected by Military Operations**

Figure 4-1 and Table 4-1 show the acreage affected by military operations in each of the four counties. The total affected area is about 353,470 acres broken out as follows: 127,600 acres are within the low-level overflight zones to the north of Fort Bragg; 142,280 acres are affected by airfield operations from Pope AFB and Simmons

Army Airfield; 33,362 acres are from the "noise impact" areas (the larger portion attributable to "height-restricted" areas); about 5,470 acres are affected by noise from the artillery ranges on Fort Bragg; and just over 40,200 acres lie in a primary or secondary growth area.<sup>1</sup> It should be noted that the largest share of the affected land area coincides with the counties' secondary and low growth areas. Figure 4-1 also shows the location and portion of county growth areas affected by these operations.

Our analysis does not examine height-restricted areas; such analysis typically addresses the type of high-rise construction that is not characteristic of the four-county area. It is very unlikely that height restrictions will significantly affect future development in any of these counties in the next 2 decades.

After identifying the primary and secondary growth areas in each county, we estimated the number of existing and anticipated housing units affected by compatible land use in each of these growth areas. Table 4-2 provides a summary of the future housing units affected by military operations in each county for the baseline scenario (i.e., assuming no additional compatible land use measures are imposed).

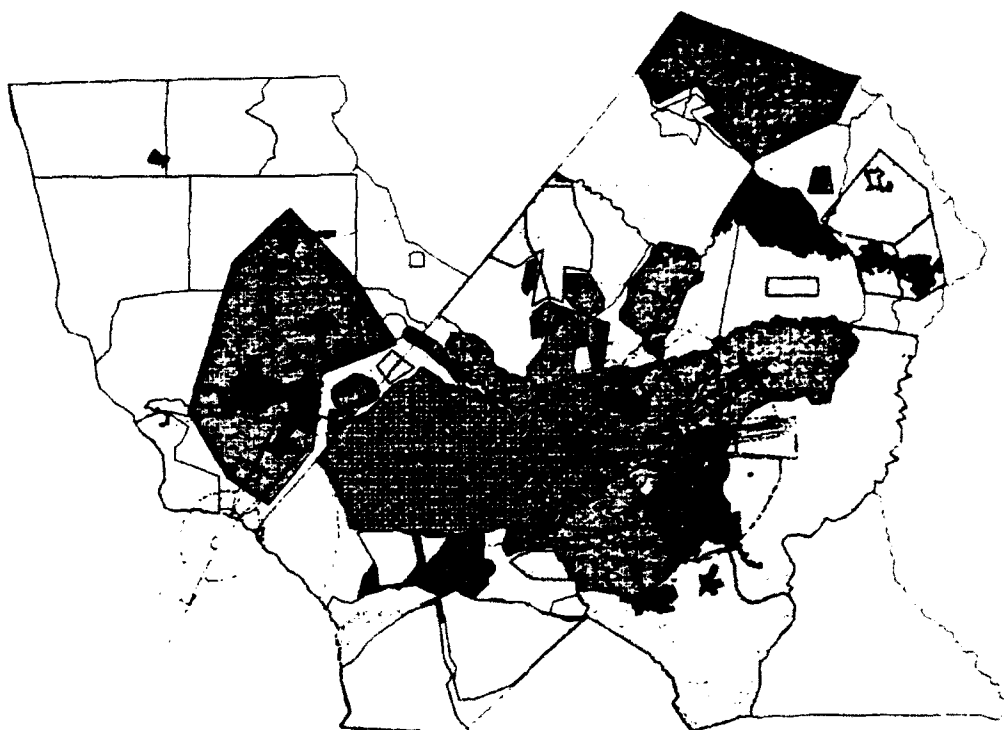
After estimating the number of housing units affected in the baseline scenario, we estimated the likely effects of imposing additional compatible land use measures on those areas. Each land use scenario was examined under three different possible growth ranges: "high," "low," and the "most likely" range of future development. The scenarios are defined in detail below.

*Scenario 1 – Baseline restriction condition:* Under this scenario, we estimate the impacts that would occur assuming that no further land use controls are imposed by local jurisdictions beyond what is currently in place. Future development would be constrained only by existing zoning.

*Scenario 2 – Limited restrictions:* Under this scenario, we estimate the impacts of imposing land use restrictions only in areas most severely affected by noise and

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<sup>1</sup>Primary growth areas are subcounty locations identified as most likely to receive the majority of future housing development. Secondary growth areas are subcounty locations likely to receive growth but at lower intensity than the primary growth areas. Low growth areas are those not identified as growth centers. These areas are expected to have a relatively low level of growth over the next decade.



- Primary Development
- Secondary Development
- Tertiary Development
- Undevelopable
- Municipalities
- Areas affected by noise, accident potential, and height restricted zones

**FIG 4-1. TOTAL ACREAGE AFFECTED BY MILITARY OPERATIONS**

TABLE 4-1

## GROWTH AREAS AFFECTED BY COMPATIBLE LAND USE IMPLEMENTATION

County	Acres affected in:			Total
	Primary growth areas	Secondary growth areas	Low growth areas	
Cumberland	23,616	3,328	0	26,944
Harnett	4,175	5,632	22,336	32,143
Hoke	2,034	7	2,944	4,985
Moore	1,427	0	8,102	9,529
Total	31,252	8,967	33,382	73,601 <sup>a</sup>

<sup>a</sup> This total excludes areas affected by height restrictions in all counties. It is unlikely future development will be affected by height restrictions.

TABLE 4-2

## FUTURE HOUSING UNITS AFFECTED BY COMPATIBLE LAND USE

County	Housing units affected in:			Total
	Primary growth areas	Secondary growth areas	Low growth areas	
Cumberland	4,592	334	0	4,926
Harnett	2,223	148	127	2,498
Hoke	1,083	7	9	1,099
Moore	1,356	0	491	1,847
Total	9,254	489	627	10,370

**Note:** The number of units in this table reflects the acreage covered under scenario 5, comprehensive land use restrictions, which covers the largest area of development in all counties.

safety impacts. This assumes there would be limited development in NAPZ areas 1 and 2 and height-restricted development in accordance with class A, B, and C restrictions. Development in all other areas reflects only current restrictions.

*Scenario 3 – Moderate restrictions:* This scenario adds restrictions on land use in more moderately affected areas. This includes NAPZ areas 1, 2, and 3 and height-restricted development in accordance with class A, B, C, D, E, and H restrictions. It also includes land use restrictions in the north, middle, and southern portions of the

low-level overflight zones. Development in all other areas reflects only current restrictions.

*Scenario 4 – Major restrictions:* This scenario increases the restrictions on land use to include NAPZ areas 1, 2, 3, and 4 and height-restricted development in accordance with class A, B, C, D, E, F, and H restrictions. It also includes land use restrictions in the northern, middle, and southern portions of low-level overflight zones in the eastern half of this area. All other areas reflect only current restrictions.

*Scenario 5 – Comprehensive restrictions:* Under this scenario, we examine the impacts associated with full implementation of all residential land use restrictions, including NAPZ areas 1, 2, 3, 4, and 5. This scenario also assumes full implementation of height-restricted land use in accordance with class A, B, C, D, E, F, G, and H restrictions and full restrictions in low-level overflight zones in the western half of this area. Under this scenario, all areas affected by noise and safety exposure would be integrated with zoning and land use plans.

Table 4-3 summarizes the compatible land use measures applied under each scenario.

**TABLE 4-3**  
**COMPATIBLE LAND USE SCENARIOS**

Land use scenario	NAPZ restrictions					Low-level overflight zones <sup>a</sup>					Height restrictions							
	1	2	3	4	5	A	B	C	E	W	A	B	C	D	E	F	G	H
Scenario 1 Baseline restriction	•																	
Scenario 2 Limited restrictions	•	•										•	•	•				
Scenario 3 Moderate restrictions	•	•	•			•	•	•			•	•	•	•	•			•
Scenario 4 Major restrictions	•	•	•	•		•	•	•	•		•	•	•	•	•	•		•
Scenario 5 Comprehensive restrictions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note: A "•" indicates that the land use restriction is applied

<sup>a</sup> Overflight zones A, B, and C as defined by the JCLUS Report. Zones E and W refer to the east and west corridors of the overflight zone

## AREAS AFFECTED BY MILITARY OPERATIONS, BY COUNTY

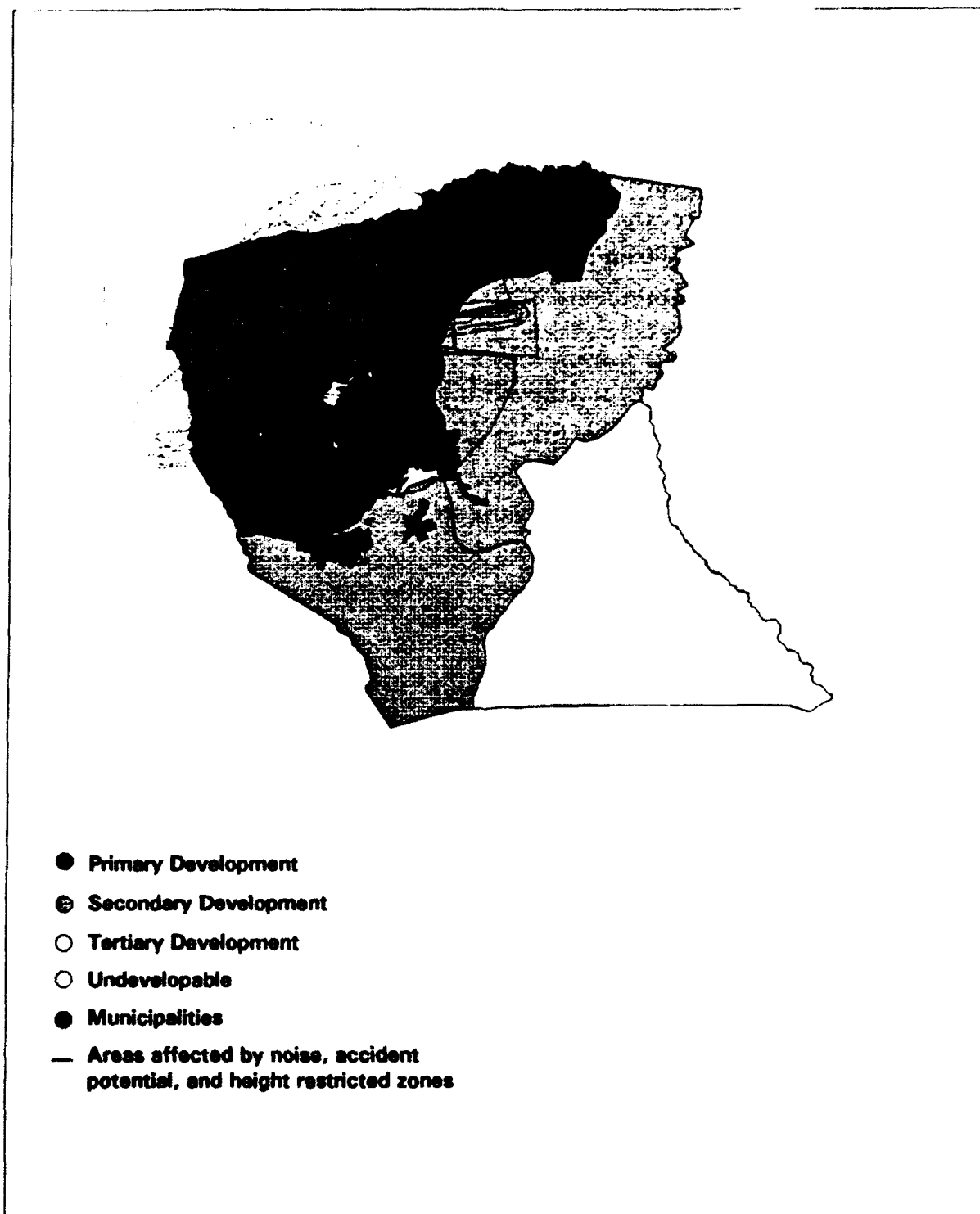
### Cumberland County

Table 4-4 shows the estimated effects of applying compatible land use controls for scenarios 1 through 5 in all affected areas of the county. Compatible land use policies recommend lowering the density of future residential development in these areas. However, a lower density standard is not likely to affect overall county growth because there is a sufficient supply of other developable land to accommodate growth in the proximity of the affected areas.

TABLE 4-4  
CUMBERLAND COUNTY LAND USE SCENARIOS

Compatible land use scenario	Acres affected by compatible land use	New units affected	New units displaced from county
Scenario 1 Baseline restriction conditions	640	61	0
Scenario 2 Limited restrictions	954	93	0
Scenario 3 Moderate restrictions	5,190	1,057	0
Scenario 4 Major restrictions	16,889	3,167	0
Scenario 5 Comprehensive restrictions	26,944	4,926	0

Figure 4-2 shows the two distinct areas of Cumberland County that are affected by noise and accident exposure associated with military operations. The first, and larger area, results from the "noise contours" generated from Pope AFB and Simmons Army Airfield. The total off-base land area falling under the noise contours zone is about 34,560 acres, with about 23,424 acres (68 percent of the total) in Cumberland County. The second area affected by military operations includes about 384 acres along the southern border of the Fort Bragg training area associated with artillery noise.



**FIG 4-2. AREAS AFFECTED BY MILITARY OPERATIONS  
CUMBERLAND COUNTY**



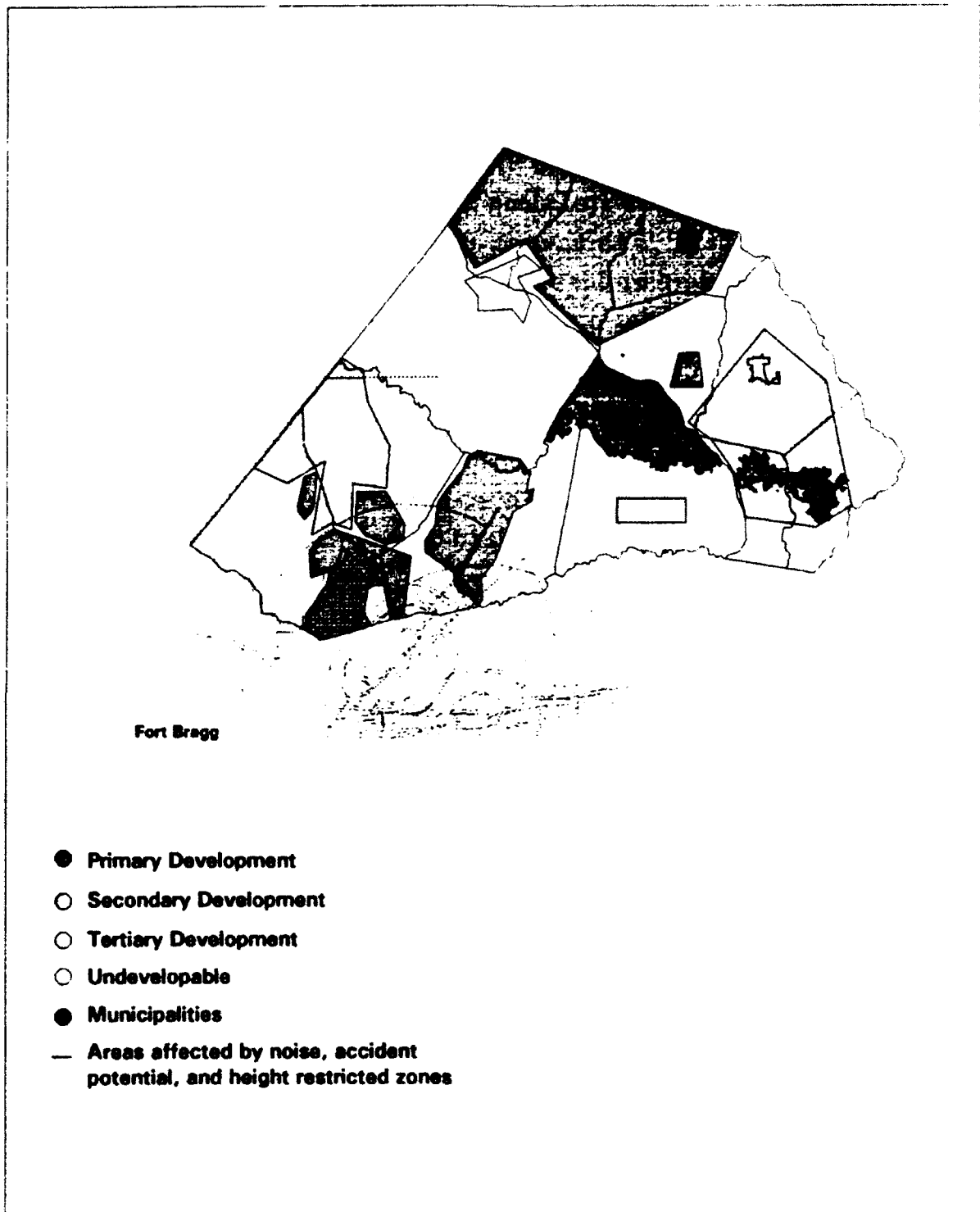
## Harnett County

Figure 4-3 shows the two distinct areas of Harnett County affected by compatible land use. The larger area is associated with the low-level overflight zones leading into the paratroop areas in the northern part of Fort Bragg. About 70,848 acres (47 percent) of that zone is within Harnett County. The second area of 4,672 acres in the southwestern part of the county is within the noise contour zone generated from Pope's and Simmons' airfield operations.

Table 4-5 shows the estimated effects of applying compatible land use controls for scenarios 1 through 5 in all affected areas of the county. Imposing land use controls would lower the density of future development in these areas. However, this lower density is not likely to affect overall county growth, because there is a sufficient supply of other developable land in the proximity of the affected areas to accommodate projected county growth without displacing any units from the county. Note that: the demand for development in Harnett county is relatively small: (11,384 new housing units by the year 2010).

**TABLE 4-5**  
**HARNETT COUNTY**

<b>Compatible land use scenario</b>	<b>Acres affected by compatible land use</b>	<b>New units affected</b>	<b>New units displaced from county</b>
Scenario 1 Baseline restrictions	0	0	0
Scenario 2 Limited restrictions	0	0	0
Scenario 3 Moderate restrictions	0	0	0
Scenario 4 Major restrictions	32,051	2,452	0
Scenario 5 Comprehensive restrictions	32,143	2,498	0



**FIG 4-3. AREAS AFFECTED BY MILITARY OPERATIONS  
HARNETT COUNTY**

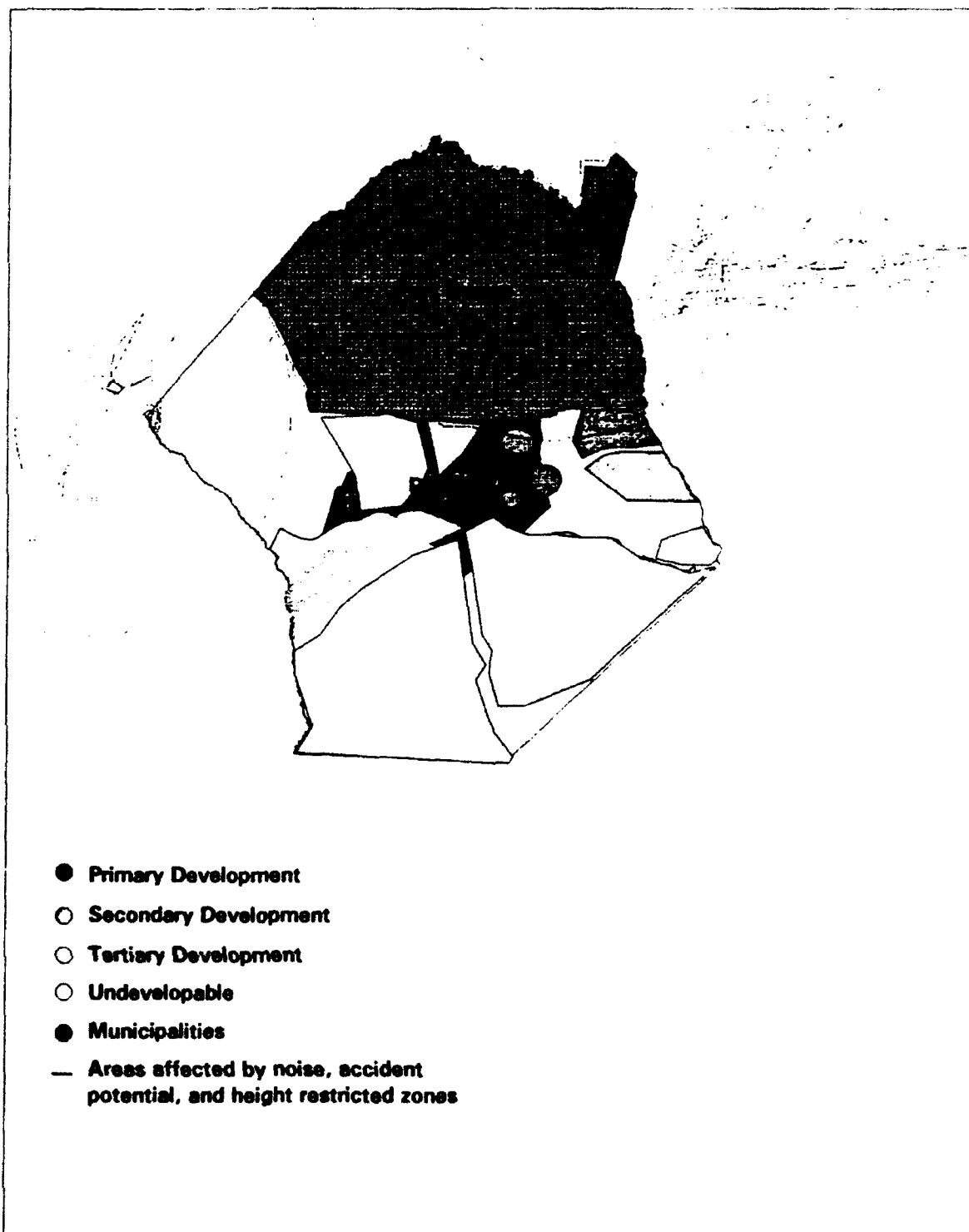
## Hoke County

Figure 4-4 shows the three distinct areas of Hoke County that are affected by compatible land use. The first area of 4,480 acres along the southern border of the Fort Bragg training area is associated with on-base artillery and air operations. The second area of 1,152 acres is located along the western boundary of the base: it shows the noise areas associated with on-base artillery. The third area of 320 acres is located in the southwestern corner of the county. It is affected by the noise contours and height restrictions associated with Camp Mackall air operations.

Table 4-6 shows the estimated effects of applying compatible land use controls for scenarios 1 through 5 in the affected areas of the county. Adopting compatible land use measures would lower the density of future development in these areas. However, this is not likely to affect the overall growth in the county, because there is a sufficient supply of other developable land to accommodate future growth without displacing any units from the county. (Note: the overall demand for development in Hoke county is small: only 3,227 housing units by the year 2010.)

**TABLE 4-6**  
**HOKE COUNTY**

<b>Compatible land use scenario</b>	<b>Acres affected by compatible land use</b>	<b>New units affected</b>	<b>New units displaced from county</b>
<b>Scenario 1</b> <b>Baseline restrictions</b>	0	0	0
<b>Scenario 2</b> <b>Limited restrictions</b>	0	0	0
<b>Scenario 3</b> <b>Moderate restrictions</b>	3,200	150	0
<b>Scenario 4</b> <b>Major restrictions</b>	4,985	1,099	0
<b>Scenario 5</b> <b>Comprehensive restrictions</b>	4,985	1,099	0



**FIG 4-4. AREAS AFFECTED BY MILITARY OPERATIONS  
HOKE COUNTY**

## Moore County

Figure 4-5 shows the two distinct areas of Moore County that are affected by military operations. The larger area consists of 57,216 acres is in the low-level overflight areas leading into the northern training areas of Fort Bragg. The second area of 1,152 acres in the southwestern part of the county is affected by the noise contours and accident potential areas associated with Camp Mackall air operations.

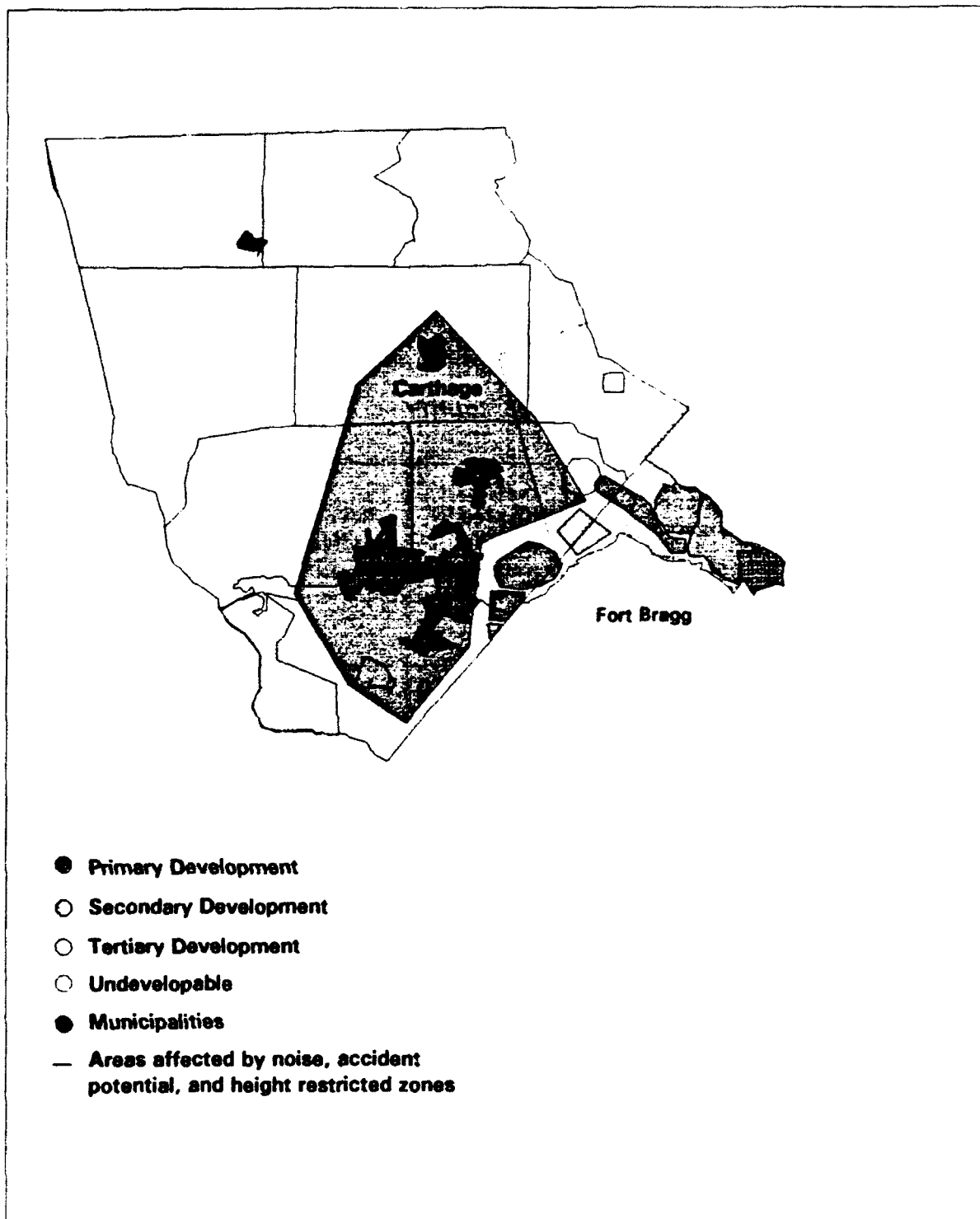
Moore county is the one county in which there would be a likely reduction in the projected level of overall county development if compatible land use controls were placed on future development. While the majority of developable land in the county is not affected by military operations, there are three primary growth areas in the southeastern part of the county that would have their growth slightly limited under three scenarios of compatible use zoning. (These growth areas are identified as MO-3, MO-4, and MO-5 on Figure 4-5.)

Wood Lake (MO-3) has 940 acres of developable land. The area has about 130 dwelling units, all of which are in the "high" price range for the county costing more than \$134,000 per unit. The area has an additional 2,400 platted undeveloped lots. Under the most-likely projection of growth, an additional 500 new housing units would be built in the Wood Lake community by the year 2010.

The growth areas labeled MO-4 and MO-5 together are 6,800 developable acres with an estimated 100 dwelling units, predominantly in the "below average" price range.<sup>2</sup> We project that under the most-likely growth levels, an additional 900 new housing units, in the "average" and "below average" price range would be built in these two areas by the year 2010. Our projection is based upon existing demographics in these areas as well as existing land uses.

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<sup>2</sup>Housing values for Moore county are based on 1990 census data and are defined as: \$134,200 for "above average", \$80,300 "average" and \$23,200 for "below average".



**FIG 4-5. AREAS AFFECTED BY MILITARY OPERATIONS  
MOORE COUNTY**

Table 4-7 shows the effects of applying the compatible land use controls of scenarios 1 through 5 to the three county areas described in the paragraph above. Under scenario 1, baseline restrictions, we assume that no additional controls are placed on land use or density. Under this scenario, future growth is not affected. Under scenario 2, limited restrictions, there is also no effect. Under scenarios 3, 4, and 5, moderate through comprehensive restrictions, we apply the restriction that all new housing units would be limited to a density of 1 dwelling unit per five acres – in accordance with compatible land use recommendations for residential development.<sup>3</sup>

**TABLE 4-7**  
**MOORE COUNTY**

Compatible land use scenario	Acres affected by compatible land use	New units affected	New units displaced from county
Scenario 1 Baseline restrictions	0	0	0
Scenario 2 Limited restrictions	0	0	0
Scenario 3 Moderate restrictions	9,529	1,847	915
Scenario 4 Major restrictions	9,529	1,847	915
Scenario 5 Comprehensive restrictions	9,529	1,847	915

Under scenarios 3, 4, and 5, we expect to see a shift in the number of dwelling units projected to be built in the three areas, with the following results:

- Average and below average priced housing units planned for these areas would be shifted to development areas where less land is required per house. We expect that of the 2,634 average and 3,402 below average priced units projected for these areas, 1,847 units would be affected if lower density zoning is imposed. Of the development shifted, we expect about 942 of these units to be built in other areas of Moore County, with the remaining

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<sup>3</sup>This dwelling unit to acreage density is based on recommendations of the JCLUS study.

County, with the remaining 915 displaced and shifted to other counties in the region, primarily to development areas in Lee and Harnett counties with similar housing prices.

- Above average priced housing units planned for the Wood Lake area would also be shifted to other areas where less land is required per house. We expect that of the 500 units projected for this area, all would be affected if lower densities were imposed. Of the affected development, we expect about 250 of these units to be built in other areas of Moore County, particularly in the communities of Southern Pines or Pinehurst. About 250 units would be displaced to areas outside the county. Of the displaced units, some likely would be built in other comparable areas in the region, such as the Buffalo Lake area in Harnett County. Also, we expect some portion of future demand to be lost to areas outside the region. This loss would primarily come from out-of-town retirement households electing to locate outside the region.
- In total, we expect the density change to displace 915 future housing units from Moore County; of this total, 250 are above average, 219 are average, and 446 are below average priced units.



## **CHAPTER 5**

### **THE IMPACTS OF COMPATIBLE LAND USE ON THE MILITARY**

#### **INTRODUCTION**

In Chapter 4, we identified the areas in each county where future land development and military operations overlap, and we examined the likely effects of changing the existing land use patterns to be compatible with military operations. In this chapter, we examine the other side of that issue — the impact on future military operations of *not* implementing compatible land use measures.

#### **TECHNICAL APPROACH**

To estimate these effects, we measured the specific conditions likely to occur with each of the five land use scenarios described earlier. For each scenario, the likely level of growth associated with each set of land use restrictions was identified. We then estimated the effects that this growth level may have on military operations. The underlying assumption is that, at some point, nonmilitary land use will intensify to a level that forces military operations to be altered in terms of mission frequency, intensity, and/or hours of operation. Consequently, the military at both Fort Bragg and Pope AFB would have to seek alternative ways of accomplishing their missions.

This chapter examines the training missions of Fort Bragg and Pope AFB and analyzes how community land use will impact those missions in the future.

#### **MILITARY TRAINING OPERATIONS AT FORT BRAGG AND POPE AFB**

The primary mission of Fort Bragg is to develop and maintain the capacity to undertake airborne assault. In support of the Army's mission to achieve rapid deployment, Pope AFB provides airborne transportation and combat air support to the Army's XVIII Airborne Corps and other combat units based at Fort Bragg.

Training exercises conducted at Fort Bragg and other training areas nearby are designed to support the airborne assault missions. Along with the delivery of troops to paradrop zones, the Military Services can also airdrop equipment and artillery.

Once troops and supporting weapons are on the ground, extensive training exercises involving live weapons firing are also conducted. These exercises include ground troops as well as air support from Army attack helicopters and Air Force fighter planes. The training missions at Fort Bragg require a substantial number of air support training missions, conducted during daytime and nighttime hours. More extensive training exercises may include air fighter units from bases throughout the Southeastern United States.

In addition to training regular troops, exercises typically involve reserve troop contingents. Reserve training at Fort Bragg includes over 20,000 reservists involved in annual 2-week training exercises. Another 65,000 reservists participate in weekend training during the year.

As described in Chapter 4, the noise and safety impacts associated with training can be categorized into three major groups: (1) impacts associated with Operations at Pope AFB and Simmons Army Airfield, (2) impacts associated with noise from artillery and live-fire training at Fort Bragg, and (3) impacts associated with low-level overflights and paradrops. Each of these training activities is described below.

### **Pope AFB and Simmons Army Airfield Operations**

Table 5-1 summarizes the daily flight operations at Pope AFB and Simmons Army Airfield. As shown in that table, the two airfields log just over 1,600 air operations (takeoffs and landings) on an average day. Of this total, over 880 takeoffs and landings are made by rotary-wing aircraft. Each year, about 350,000 air operations and 14,000 close air support missions take place in military training areas.

### **Artillery and Live-Fire Training at Fort Bragg**

In addition to the air assault training, the Army's Airborne and Special Operations forces conduct live-fire artillery and armor training exercises on Fort Bragg. These exercises involve close air support from Air Force tactical fighters, field artillery, helicopter gun ships, attack helicopters, and mortars. Exercises are conducted during both daytime and nighttime training hours. Each year, over 60,000 rounds of munitions are fired during these exercises, including an average of 90 days of tank firing and additional fixed-range training exercises. Fort Bragg's multipurpose ranges are used an average of 240 days per year.

TABLE 5-1

## DAILY FLIGHT OPERATIONS AT POPE AFB AND SIMMONS ARMY AIRFIELD

	Day	Night	Total
Pope AFB Takeoffs and landings	503	103	606
Simmons Army Airfield Fixed-wing aircraft takeoffs and landings	88	32	120
Rotary-wing aircraft takeoffs and landings	650	236	886
Total (all aircraft, both locations)	1,241	371	1,612

**Note:** Data in this table are extracted from Army and Air Force data for 1989, which represent the highest level of training operations on record.

### Low-Level Overflights and Parachutes

One particularly important element of the air assault training involves low-altitude flights by Air Force transport aircraft (about 300 feet above the ground) while approaching and exiting the parachute zones. As the transport aircraft approach the training areas from the north, they slow down from 210 mph to 130 mph at a low altitude. Upon reaching the designated checkpoint, the planes "pop up" immediately before the drop zones, rising from 300 to 1,000 feet above the ground. Parachute operations and Air Force practice runs are conducted on a daily basis during both daytime and nighttime hours. In a single year, there are about 520 parachute drops and 525 equipment drops that include low-level overflight operations.

The ability to fly in at low levels is critical to maintaining the air assault training capabilities of the Army and the Air Force. In total, these overflight areas cover about 127,600 acres in Harnett and Moore counties.

### ESTIMATING THE IMPACTS OF LAND USE ON MILITARY OPERATIONS

After identifying the types of military training most likely to be affected by local land use conditions, we examined the likely change in military operations that would have to occur given the degree of compatible land use measures under each scenario. Table 5-2 summarizes the restrictions applied under each scenario. Each

scenario is described in detail below, along with the impacts we estimate would occur over time.

**TABLE 5-2**  
**MILITARY OPERATIONS SCENARIOS**

Land use scenario	Restrictions on military						
	A	B	C	D	E	F	G
Scenario 1 Baseline restriction condition	•	•	•		•	•	
Scenario 2 Limited restrictions	•	•		•	•	•	
Scenario 3 Moderate restrictions	•	•					
Scenario 4 Major restrictions							•
Scenario 5 Comprehensive restrictions							

**Notes:** "•" indicates that the restriction is applied. Restrictions: A = limits on low-level night flight operations; B = zones A, B, and C overflight areas reduced by two-thirds; C = air operations from Simmons and Pope would be reduced by 25 percent; D = air operations from Simmons and Pope would be reduced by 15 percent; E = limits on night artillery operations; F = limits on night airfield operations; and G = low-level overflight operations limited to west corridor.

*Scenario 1 – Baseline Restriction Condition:* Under this scenario, there would be no further land use controls imposed by local jurisdictions beyond what is currently in place. Under this condition, we would expect to see local land use have a significant impact on the course of military operations. The land use occurring under this scenario would be sufficiently intensive to require alteration of military operations to accommodate public health and safety concerns. Public concerns could lead to enough political pressure to ultimately result in the restriction of operations from Fort Bragg and Pope AFB as follows:

- Low-level nighttime paradrops would be cut back by 50 percent.
- Low-level overflight areas would be limited to two-thirds of the current area.

- All airfield operations from Simmons Army Airfield and Pope AFB would be cut back by 25 percent.
- Nighttime airfield operations from Simmons Army Airfield and Pope AFB would be cut back by 50 percent.
- Nighttime artillery and armor training exercises would have to be lessened.

*Scenario 2 – Limited Restrictions:* Under this scenario, limited compatible land use restrictions would be adopted by local communities in the areas most severely affected by noise. Land use occurring under this scenario would be intensive enough to require alteration of military operations to accommodate public health and safety concerns (though slightly less than required under the baseline condition). Again, these public concerns would lead to enough political pressure to result in the restriction of operations from Fort Bragg and Pope AFB as follows:

- Low-level night paratroops would be cut back by 50 percent.
- Low-level overflight areas would be limited to two-thirds of the current area.
- All airfield operations from Simmons Army Airfield and Pope AFB would be cut back by 15 percent.
- Nighttime airfield operations from Simmons Army Airfield and Pope AFB would be cut back by 50 percent.
- Nighttime artillery and armor training exercises would have to be lessened.

*Scenario 3 – Moderate Restrictions:* Under this scenario, local communities would apply compatible land use measures over a larger land area. Land use occurring under this scenario would lessen the intensity of future development. As a result, future development would not affect military operations as much as would scenarios 1 and 2; however, operations from Fort Bragg and Pope AFB would still have to be restricted as follows:

- Low-level nighttime paratroops would be cut back by 50 percent.
- The low-level overflight areas would be limited to two-thirds of the current areas.

*Scenario 4 – Major Restrictions:* Under this scenario, local communities would apply compatible land use measures over an even larger land area. Land use occurring under this scenario would lessen the intensity of future development over the previous three scenarios. As a result, future development would have less of an

effect on military operations than the previous scenarios. However, some operations such as the low-level overflight areas would be limited to the western half of the overflight corridor, primarily over Moore and Lee counties.

*Scenario 5 – Comprehensive Restrictions:* Under this scenario, local communities would adopt all compatible land use measures recommended by the *Joint Compatible Land use Policy Study* (JCLUS). Land use occurring under this scenario would lessen the intensity of future land development in affected county growth areas so much that military operations from Fort Bragg and Pope AFB would not have to be restricted (i.e., the current level and schedule of training activities would not have to be altered).

After establishing the level of growth associated with each land use scenario and the likely effect on military operations, we analyzed how these military operations will have to be altered in the future. Underlying these analyses are two key assumptions. First, the current mode of military training was assumed to be maintained in the future. Second, it was further assumed that the current military forces at Fort Bragg and Pope AFB would not choose to relocate solely to avoid encroachment.

To complete the analysis, we obtained information from the military operations specialists at both Fort Bragg and Pope AFB on how they would have to alter training operations under each of the land use scenarios. In most cases, the military indicated that if training and tempos had to be reduced to avoid encroachment, the exercises would have to take place at other military training areas such as Fort Pickett, Va., or Fort Stewart, Ga. Conducting training exercises at these alternative locations would involve a movement of troops, equipment, and aircraft beyond the volumes now associated with training at Fort Bragg. The information obtained from the military also included estimates of the number of training sorties, personnel, equipment, and flight hours associated with moving these operations to other locations for training.

## **COST OF SHIFTING MILITARY OPERATIONS**

Table 5-3 shows the estimated cost to the military associated with each compatible land use scenario. Under scenario 1, with baseline land use (i.e., no change over current land use measures), the costs associated with changing military operations are estimated to grow to almost \$8 million per year. These costs are due

primarily to additional flight hours associated with moving to other locations to conduct training exercises. The costs associated with scenario 2 are the same, about \$8 million per year. Adopting the additional compatible land use measures of scenarios 3 and 4 lowers the projected costs to the military to almost \$2.7 million per year. Under scenario 5, with comprehensive land use measures, the military would not incur any additional costs.

**TABLE 5-3**  
**ESTIMATED ANNUAL COSTS OF MILITARY OPERATIONS SCENARIOS**  
**(\$ millions)**

Land use scenario	Restrictions on military operations							2010 total annual costs <sup>a</sup>
	A	B	C	D	E	F	G	
Scenario 1 Baseline restriction	\$3.00	\$4.01	0	—	\$0.96	0	—	\$7.97
Scenario 2 Limited restrictions	3.00	4.01	—	0	0.96	0	—	7.97
Scenario 3 Moderate restrictions	3.00	4.01	—	—	—	—	—	7.01
Scenario 4 Major restrictions	—	—	—	—	—	—	\$2.67	2.67
Scenario 5 Comprehensive restrictions	—	—	—	—	—	—	—	—

**Notes:** Restrictions: A = limits on low-level night flight operations; B = zones A, B, and C overflight areas reduced by two-thirds; C = air operations from Simmons and Pope would be reduced by 25 percent; D = air operations from Simmons and Pope would be reduced by 15 percent; E = limits on night artillery operations; F = limits on night airfield operations; and G = low-level overflight operations limited to west corridor.

<sup>a</sup> Estimated annual costs to the military associated with land use restrictions for the year 2010 in 1992 dollars.

## **CHAPTER 6**

### **THE FISCAL IMPACTS OF COMPATIBLE LAND USE ON LOCAL COMMUNITIES**

The purpose of a fiscal impact analysis (FIA) is to provide decision makers with the framework for assessing the costs and benefits to the local communities associated with each compatible land use scenario. This chapter summarizes the FIA approach and the results of our analysis for each of the affected counties. A more detailed explanation of the methodologies and assumptions is provided in the appendices of this report.

#### **ESTIMATING LOCAL FISCAL IMPACTS**

##### **Establishing the Baseline Growth Condition**

An assessment of the fiscal impacts associated with each land use scenario begins with the establishment of the baseline growth condition for each county. The term "baseline" refers to the level of population growth and related demand for new housing that would occur without any change in current land use policies. Local information about projected growth areas, land use characteristics, and the characteristics of new housing development are key components of the development of the baseline growth condition.

Local and state officials are often the best sources of data; frequently, they are the individuals who can most accurately interpret data and forecast trends. Both local and state officials were consulted during the establishment of baseline conditions for the four counties involved in this study. The baseline analysis shows that the region is expected to experience only moderate increases in population (about 1 percent a year) and moderate economic growth over the next 20 years.

Establishing the baseline growth condition for the region is a necessary first step for analyzing change, if any, in growth associated with the compatible land use recommendations of scenarios 2 through 5. The baseline scenario (scenario 1) shows "where a county is likely to be" from a fiscal perspective, assuming that no change is made to accommodate compatible land use. This factor is a key element in the



analysis of the effect of adopting compatible land use for the areas affected by military operations. The fiscal impact of each scenario is determined by comparing the baseline conditions with the expected fiscal change associated with the land use measures recommended under each scenario. Moreover, the baseline analysis describes the fiscal position of each county in the absence of any changes in local land use policies.

### **The Fiscal Impact Analysis Model**

The Fiscal Impact Analysis (FIA) model is used to prepare the FIA for the counties. The model was developed for use on a microcomputer and designed to support alternative scenario analyses. The FIA has five groups of inputs that provide information to the model. Local officials provided the source information for most of the key values applied in the model. Values for county growth projections and historical fiscal conditions were obtained from state government sources. The input values of the FIA model identify the key determinants of the fiscal impacts related to changing land use policies in each county. Each input group is briefly discussed in the following subsections.

#### ***Existing Land Use***

The existing land use inputs for each county were derived from an analysis of local and U.S. Census data and U.S. Geological Survey maps. This information includes data about the acres of developable land in each county; the number of existing housing units, by type and value; and the estimated developable land in use. These data were used to estimate the land area available for new development in each subcounty growth area.

#### ***Projected Land Use***

The projected land use inputs were derived from an analysis of state and local growth projects for each county. That analysis projected population, new housing (by value), and the land requirements associated with this growth. The results of that analysis were the key inputs for estimating projected land use. These results address the number of dwelling units, by value, required to meet the housing demands of growth, as well as the estimated acreage required to accommodate housing, given the subcounty growth areas likely to be developed.

### ***Affected Areas***

Identification of the areas affected by military operations was based on the analysis of primary, secondary, and other growth areas of each county that are in some way affected by military operations at Fort Bragg and Pope AFB. That analysis addresses the areas identified by the JCLUS and data from the Military Services. That analysis provides the inputs for the FIA model about the areas affected by military operations, as well as the estimated number of housing units, by value, that will be built in these areas, assuming the acceptance of the recommendations of each land use scenario. This input group also considers inputs about the number of projected housing units, by value, likely to be displaced from a county under each scenario.

### ***Other Growth-Related Inputs***

The values in this input group were generated from state and local data sources. These data include inputs such as county housing unit values grouped by above-average, average, and below-average price; estimated household size in the year 2010; the value of commercial property associated with housing; current and projected populations; and the rate of state projected population growth applied to the model.

### ***Historical Fiscal Data***

The historical fiscal data compiled by the State of North Carolina for the FIA model were obtained from audited financial statements for each county. In some cases, calls to local officials verified and supplemented historical budget data and provided adjustments for making fiscal projections. The combination of these sources – historical information and local interviews – provided the fiscal inputs to the county FIA models.

## **COUNTY FISCAL IMPACT ANALYSES**

### **Technical Approach**

An FIA was completed for each of the four counties included in this study. The analysis is structured to reflect each county's unique features. The FIAs establish fiscal projections of baseline annual revenue and expenditure trends for the year 2010 based on historical fiscal information from FY88, FY89, and FY90 – adjusted for

inflation. Scenario-related revenue and expenditure forecasts are made by applying these trends to the projected population growth and to the associated residential development anticipated with the implementation of compatible land use under each scenario.

The model outputs for each county are divided into two parts: scenario 1 is the baseline condition and shows the expected fiscal flows associated with county growth, assuming no change in current land use policies; scenarios 2 through 5 show the expected fiscal flows associated with adopting compatible land use controls. Information is presented in terms of the incremental change in the annual budget for the year 2010 (in 1990 dollars) to maximize its usefulness to decision makers.

Three important assumptions underlie the impact estimates. First, we assume that the value of future housing units will reflect the current pattern of above-average, average, and below-average housing values in each county. Second, we assume that current military populations in the region will remain stable. Therefore, regional growth will be attributed to nonmilitary sources. Third, we assume that the socioeconomic characteristics of the incoming populations will generally be the same as the characteristics of the existing county populations.

### **Cumberland County**

The FIA results for Cumberland County are summarized in Table 6-1. Based on the most likely level of growth, the county will require an additional 28,414 new housing units by the year 2010. The number of new units affected by adopting compatible land use increases under each scenario: from 61 affected units under scenario 1, to 4,926 units under scenario 5. However, there are no new units displaced from the county under any scenario, indicating that imposing additional compatible land use restrictions does not affect the overall county growth. As a result, the county's projected annual revenues, expenditures, and net revenues (revenues minus expenditures) also remain unaffected. Adopting compatible land use measures in the county areas affected by military operations will have no fiscal impact.

### **Harnett County**

The FIA results for Harnett County are summarized in Table 6-2. Based on the most likely level of growth, the county will require an additional 9,153 new housing

**TABLE 6-1**  
**THE IMPACTS OF COMPATIBLE LAND USE ON CUMBERLAND COUNTY**  
**(1990 dollars)**

Impacts	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Growth assumption	Most likely	Most likely	Most likely	Most likely	Most likely
New units required	28,414	28,414	28,414	28,414	28,414
New units affected	61	93	1,057	3,167	4,926
New units displaced from county	0	0	0	0	0
Value of displaced units	\$0	\$0	\$0	\$0	\$0
Annual revenues	\$34,887,308	\$34,887,308	\$34,887,308	\$34,887,308	\$34,887,308
Annual expenditures	\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510
Net revenues <sup>a</sup>	\$843,798	\$843,798	\$843,798	\$843,798	\$843,798
Change (from baseline case)	\$0	\$0	\$0	\$0	\$0

<sup>a</sup> Net revenues in Hoke County reflect a small deficit. Typically, the budget would be adjusted for this in the following year. The county would not run a budget deficit each year, as shown by these estimates.

units by the year 2010. No new units are affected under the compatible land use restrictions imposed under scenarios 1 through 3. Under scenarios 4 and 5, as many as 2,498 units would be affected. However, as in Cumberland County, no new units are likely to be displaced from the county under any scenario. This indicates that imposing additional compatible land use restrictions does not affect aggregate county growth. As a result, the county's projected annual revenues, expenditures, and cash flow remain unchanged. Therefore, adopting compatible land use measures in those areas affected by military operations will have no fiscal impact on the county.

### **Hoke County**

The FIA results for Hoke County are summarized in Table 6-3. Based on the most likely level of growth, the county will require an additional 2,587 new housing units by the year 2010. No new units are affected by the compatible land use restrictions imposed under scenarios 1 through 3. Under scenarios 4 and 5, as many as 1,099 units would be affected. Hoke County also is not expected to have any new units displaced from the county as a result of adopting compatible land use restrictions, indicating that county growth will not be affected. As a result, the county's projected annual revenues, expenditures, and net revenues remain constant

**TABLE 6-2**  
**THE IMPACTS OF COMPATIBLE LAND USE ON HARNETT COUNTY**  
**(1990 dollars)**

Impacts	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Growth assumption New units required	Most likely 9,153	Most likely 9,153	Most likely 9,153	Most likely 9,153	Most likely 9,153
New units affected	0	0	0	2,452	2,498
New units displaced from county	0	0	0	0	0
Value of displaced units	\$0	\$0	\$0	\$0	\$0
Annual revenues	\$9,596,729	\$9,596,729	\$9,596,729	\$9,596,729	\$9,596,729
Annual expenditures	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361
Net revenues <sup>a</sup>	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368
Change (from baseline case)	\$0	\$0	\$0	\$0	\$0

<sup>a</sup> Net revenues in Hoke County reflect a small deficit. Typically, the budget would be adjusted for this in the following year. The county would not run a budget deficit each year, as shown by these estimates.

under all scenarios. The county will experience no fiscal impacts by adopting compatible land use restrictions in those areas affected by military operations.

**TABLE 6-3**  
**THE IMPACTS OF COMPATIBLE LAND USE ON HOKE COUNTY**  
**(1990 dollars)**

Impacts	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Growth assumption New units required	Most likely 2,587	Most likely 2,587	Most likely 2,587	Most likely 2,587	Most likely 2,587
New units affected	0	0	0	1,099	1,099
New units displaced from county	0	0	0	0	0
Value of displaced units	\$0	\$0	\$0	\$0	\$0
Annual revenues	\$2,154,396	\$2,154,396	\$2,154,396	\$2,154,396	\$2,154,396
Annual expenditures	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274
Net revenues (losses) <sup>a</sup>	(\$4,878)	(\$4,878)	(\$4,878)	(\$4,878)	(\$4,878)
Change (from baseline case)	\$0	\$0	\$0	\$0	\$0

<sup>a</sup> Net revenues in Hoke County reflect a small deficit. Typically, the budget would be adjusted for this in the following year. The county would not run a budget deficit each year, as shown by these estimates.

## Moore County

Moore is the one county where adopting compatible land use restrictions is likely to have an impact on county finances. The FIA results for Moore County are shown in Table 6-4. Based on the most likely level of projected growth, the county will require an additional 7,809 new housing units by the year 2010. No new units are affected under the compatible land use restrictions imposed under scenarios 1 and 2. Under scenarios 3, 4, and 5, as many as 1,847 units would be affected. As many as 915 of these new units would be displaced from the county if the compatible land use restrictions of scenarios 3, 4, or 5 were to be imposed. The value mix for these units includes 250 above-average, 219 average, and 446 below-average units. The total value of all of these units is about \$61.5 million.

**TABLE 6-4**  
**THE IMPACTS OF COMPATIBLE LAND USE ON MOORE COUNTY**  
**(1990 dollars)**

Impacts	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Growth assumption	Most likely	Most likely	Most likely	Most likely	Most likely
New units required	7,809	7,809	7,809	7,809	7,809
Above-average \$ value	2,634	2,634	2,634	2,634	2,634
Average \$ value	3,402	3,402	3,402	3,402	3,402
Below-average \$ value	1,773	1,773	1,773	1,773	1,773
New units affected	0	0	1,847	1,847	1,847
New units displaced from county	0	0	915	915	915
Value of displaced units	\$0	\$0	\$61,482,900	\$61,482,900	\$61,482,900
Annual revenues	\$8,818,821	\$8,818,821	\$7,885,549	\$7,885,549	\$7,885,549
Annual expenditures	\$8,531,362	\$8,531,362	\$7,461,727	\$7,461,727	\$7,461,727
Net revenues*	\$287,459	\$287,459	\$423,822	\$423,822	\$423,822
Change (from baseline case)	\$0	\$0	\$136,362	\$136,362	\$136,362

\* Net revenues in Hoke County reflect a small deficit. Typically, the budget would be adjusted for this in the following year. The county would not run a budget deficit each year, as shown by these estimates.

The loss of this future development would likely have a positive rather than a negative impact on county finances. Although 915 units would be displaced, the fiscal effects of this loss would result in a slight fiscal benefit to the county. This fiscal benefit is attributable to the value mix of units expected to be displaced. Because the displaced units are predominantly below average in value, the impact of not having to provide services to the 915 units induces a slightly positive net revenue.

Table 6-5 illustrates the estimated fiscal flows associated with housing values in Moore County. As shown in this table, each new unit of above-average value tends to generate more in public revenues than it requires in public expenditures, leading to an expected positive net revenue of \$349 per household. Units at the average county market value would produce a slightly negative net revenue for each household. Correspondingly, units in the below-average category typically require more in public expenditures than they provide in public revenues, leading to a negative net revenue of \$484 per household. Overall, we would expect the fiscal impacts of adopting compatible land use measures to induce a slightly positive net revenue of about \$136,000 per annum (shown in Table 6-4).

**TABLE 6-5**  
**ASSESSING FISCAL IMPACTS IN MOORE COUNTY**  
**(1990 dollars)**

Cost category	Average market value by category <sup>a</sup>	Revenues generated (per household)	Expenditures generated (per household)	Net revenue (per household)
Above average	\$134,200	\$1,518	\$1,169	\$349
Average	80,300	1,134	1,169	(35)
Below average	23,200	685	1,169	(484)

<sup>a</sup> Estimated from 1990 census data. The value of the below-average cost category is adjusted downward to account for the tendency for mobile homes to depreciate in value.

### ***Secondary Impacts***

Assuming that Moore County adopts compatible land use measures and that some projected new housing spills over to nearby counties, it follows that the recipient counties would also be impacted fiscally. We estimate that Harnett County would gain 383 of the units displaced from Moore, adding to the overall level of Harnett County growth. Of the total new units, the larger proportion would be in the below-average price range for the county, as shown in Table 6-6. This would lead to a slightly negative impact on Harnett County of about \$50,000 per annum as a secondary result of Moore County adopting compatible use zoning.

TABLE 6-6

**FISCAL IMPACT ON HARNETT COUNTY OF MOORE COUNTY COMPATIBLE LAND USE**  
(1990 dollars)

Cost category	Number of units displaced from county	Number of units gained by county	Annual fiscal impact of change <sup>a</sup>
Above average	0	50	—
Average	0	110	—
Below average	0	223	—
Total	0	383	—\$50,000

**Note:** Fiscal impacts are for scenario 5, comprehensive restrictions, under expected growth levels.

<sup>a</sup> Fiscal impact = the change in cash flow, over the baseline case (no land restrictions for the year 2010) in 1992 dollars.

## SUMMARY

Adopting compatible land use is not likely to result in any significant negative fiscal impacts to the four counties. The decision to adopt or not to adopt compatible land use measures is essentially cost-and-benefit neutral in terms of impact on public finances. Table 6-7 illustrates this point for each of the four counties.

TABLE 6-7

**FISCAL IMPACTS OF ADOPTING COMPATIBLE LAND USE**  
(Net fiscal impact 1990 dollars)

County	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Cumberland	0	0	0	0	0
Harnett	0	0	0	0	0
Hoke	0	0	0	0	0
Moore	0	0	\$136,000 <sup>a</sup>	\$136,000	\$136,000

**Note:** Net fiscal impact = the change in net revenues (revenues minus expenditures) compared to the baseline case of not imposing any additional land use restrictions.

<sup>a</sup> Under the high- and low-growth assumptions, the impact estimates are \$1,156,000 and \$116,000, respectively.



## **CHAPTER 7**

### **FINDINGS AND CONCLUSIONS**

This report examined the economic and fiscal implications associated with adopting compatible land use restrictions in the local four-county area most affected by Fort Bragg–Pope AFB military operations. The local governments and the Military Service representatives should establish a cooperative policy on adopting compatible land use recommendations that recognize the costs and benefits associated with those land use decisions. The following paragraphs summarize the major findings and conclusions of our study. These may serve as a basis for decision making. If some degree of compatible land use is not adopted in the four counties under study, then future development is likely to alter military operations and ultimately threaten the viability of Fort Bragg and Pope AFB.

#### **FINDINGS**

Continuous training exercises are essential to maintain the military readiness of Fort Bragg–Pope AFB as a major training and force projection complex. The military importance of these bases will remain stable during the coming decades. Compatible land use restrictions are essential if Fort Bragg–Pope AFB are to remain viable in maintaining combat-ready forces in the future. In the absence of any further compatible land use restrictions (the status quo), military operations will have to be significantly restricted over the next 2 decades. In most cases, military operations cannot be moved from their existing training sites without incurring additional costs.

Fort Bragg and Pope AFB directly account for nearly one out of every four direct jobs in the four-county area. In turn, these jobs generate other employment in the region. The combined earnings of military and civilian personnel at the bases account for 21 percent of all regional earnings. The installations will continue to be critical to the area economy during the next 2 decades. These bases provide the area with exceptional economic stability.

Population projections anticipate stable growth rates in the four-county region of approximately 1 percent annually over the next 2 decades. Most of the growth is

expected to result from "natural" increase, with some immigration of retired people from outside the area. To accommodate this growth, over 58,000 new housing units will be built by the year 2010, with over 60 percent to be constructed in Cumberland County.

## **CONCLUSIONS**

Just over 350,000 acres of land are affected in some way by military operations. Of this total, over 30,000 are in primary growth areas. Given current land use restrictions, about 13,000 future housing units would be built in affected areas during the next 2 decades. Most of these housing units would be in the primary growth areas.

All four counties have substantial amounts of developable land located outside of the areas affected by military operations. In total, there are over 1 million acres available for development in the four-county area. We estimate the total acreage required to accommodate future growth to be less than 50,000 acres through the year 2010.

The fiscal impacts to county finances of adopting compatible land uses are negligible. This is due largely to the substantial amounts of land available for development outside the areas affected by military operations. Local jurisdictions have the ability to direct intensive development away from affected areas without incurring any significant costs. However, the military authorities do not have the same flexibility. In Cumberland, Harnett, and Hoke counties there would be no fiscal impacts associated with adopting compatible land use restrictions. In Moore County, adopting a moderate level of compatible land use restrictions would reduce the number of units constructed by about 900. However, because this reduction is mostly comprised of lower priced homes, the relocation of this development outside the county would likely lead to a small fiscal surplus in Moore County.

**APPENDIX A**

**SUPPORTING TABLES AND DOCUMENTATION  
FOR CHAPTER 3**

## **SUPPORTING TABLES AND DOCUMENTATION FOR CHAPTER 3**

This appendix presents the tables and other documentation that support the analysis presented in Chapter 3 of the main text. The supporting data are presented in a series of annexes as follows:

**Annex 1: Existing and Projected Land Use**

**Annex 2: Demand Analysis for the Fort Bragg – Pope Air Force Base (AFB) Impact Area**

**Annex 3: Methodology and Assumptions for Estimating Existing and Projected Land Use for the Four Counties**

**ANNEX A-1**

**EXISTING AND PROJECTED LAND USE**

## EXISTING AND PROJECTED LAND USE

**TABLE A-1**  
**EXISTING AND PROJECTED LAND USE – CUMBERLAND COUNTY**

Development subarea code	Total developable acres	Existing units <sup>a</sup>	Developable acres in use	New units required				Acres of demand for development
				High <sup>b</sup>	Medium <sup>b</sup>	Low <sup>b</sup>	Total	
CU-1	77,683	5,468	6,309	434	2,151	1,290	3,875	3,875
CU-2	87,910	3,193	3,672	53	316	110	479	479
CU-3	54,563	9,290	6,234	1,070	2,468	242	3,780	2,012
CU-4	19,699	13,802	5,521	828	7,685	791	9,304	3,101
CU-5	16,819	24,771	12,316	718	2,016	1,189	3,923	724
CU-6	16,201	20,753	8,597	933	6,032	879	7,844	2,541
CU-7	44,227	9,374	4,051	904	3,122	298	4,324	1,230
CU-9	8,160	4,759	1,790	16	594	177	787	184
Total	325,262	91,410	48,490	4,956	24,384	4,976	34,316	14,146

**Notes:** Gross acres = 418,003; total developable acres = 325,262. Developable acres *exclude* undevelopable areas such as state parks; wetlands; flood plains; and land reserved for roads, schools, and other public infrastructure.

<sup>a</sup> Fayetteville Urbanized Area and Cumberland County, *Population and Economic Study*, Feb. 1991, based on 1988 data.

<sup>b</sup> High, medium, and low refer to unit market price.

**TABLE A-2**  
**EXISTING AND PROJECTED LAND USE – HARNETT COUNTY**

Development subarea code	Total developable acres	Existing units	Developable acres in use	New units required				Acres of demand for development
				High <sup>a</sup>	Medium <sup>a</sup>	Low <sup>a</sup>	Total	
HA-1	44,959	3,303	4,502	837	1,575	100	2,512	3,563
HA-2	1,469	128	58	136	200	50	386	184
HA-3	31,661	8,636	4,784	100	200	200	500	254
HA-4	2,883	224	275	62	129	119	310	433
HA-5	15,667	2,053	2,517	293	768	763	1,824	2,396
HA-6	5,587	468	448	188	1,437	971	2,596	1,459
HA-7	3,942	250	215	600	400	0	1,000	748
HA-8	18,986	1,056	1,300	143	122	235	500	858
Subtotal	125,154	16,118	14,099	2,359	4,831	2,438	9,628	9,895
Balance of county	198,531	11,778	13,777	527	843	386	1,756	2,010
Total	323,685	27,896	27,876	2,886	5,674	2,824	11,384	11,905

**Notes:** Gross acres = 380,800; total developable acres = 323,685. Developable acres do not include undevelopable areas such as state parks; wetlands; flood plains; and land reserved for roads, schools, and other public infrastructure.

<sup>a</sup> High, medium, and low refer to market price.

**TABLE A-3**  
**EXISTING AND PROJECTED LAND USE – HOKE COUNTY**

Development subarea code	Total developable acres	Existing units	Developable acres in use	New units required				Acres of demand for development
				High <sup>a</sup>	Medium <sup>a</sup>	Low <sup>a</sup>	Total	
HO-1	3,053	805	657	477	800	400	1,677	1,012
HO-2	3,645	404	465	22	38	100	160	174
HO-3	2,016	104	114	100	325	347	772	322
HO-4	7,258	129	213	22	42	100	164	271
HO-5	1,632	70	116	5	10	36	51	56
Subtotal	17,604	1,512	1,605	626	1,215	983	2,824	1,835
Balance of county	85,003	5,682	9,393	38	83	282	403	696
Total	102,607	7,194	10,998	664	1,298	1,265	3,227	2,531

**Notes:** Gross acres = 250,368; total developable acres = 102,607. Developable acres do not include undevelopable areas such as state parks; wetlands; flood plains; and land reserved for roads, schools, and other public infrastructure.

<sup>a</sup> High, medium, and low refer to market price.



**TABLE A-4**  
**EXISTING AND PROJECTED LAND USE - MOORE COUNTY**

Development subarea code	Total developable acres	Existing units	Developable acres in use	New units required				Acres of demand for development
				High <sup>a</sup>	Medium <sup>a</sup>	Low <sup>a</sup>	Total	
MO-1	1,440	719	348	178	300	0	478	189
MO-2	2,061	141	212	0	61	370	431	744
MO-3	940	130	130	500	0	0	500	290
MO-4	4,950	50	115	0	200	300	500	575
MO-5	1,850	50	115	0	200	200	400	460
MO-6	3,174	75	248	200	0	0	200	1,320
MO-7	1,008	25	138	0	200	0	200	660
MO-8	163	100	69	0	175	0	175	63
MO-9	3,994	3,308	1,517	700	825	0	1,525	595
MO-10	23,345	5,481	3,358	50	656	257	963	516
MO-11	4,320	3,134	1,882	1,100	650	0	1,750	1,415
MO-13	55,432	7,897	7,059	157	500	197	854	781
Subtotal	102,677	21,110	15,191	2,885	3,767	1,324	7,976	7,608
Balance of county	273,155	6,248	9,464	303	350	821	1,474	1,718
Total	375,832	27,358	24,655	3,188	4,117	2,145	9,450	9,326

**Note:** Gross acres = 447,232; total developable acres = 375,832. Developable acres do not include undevelopable areas such as state parks; wetlands; flood plains; and land reserved for roads, schools, and other public infrastructure.

<sup>a</sup> High, medium, and low refer to market price.

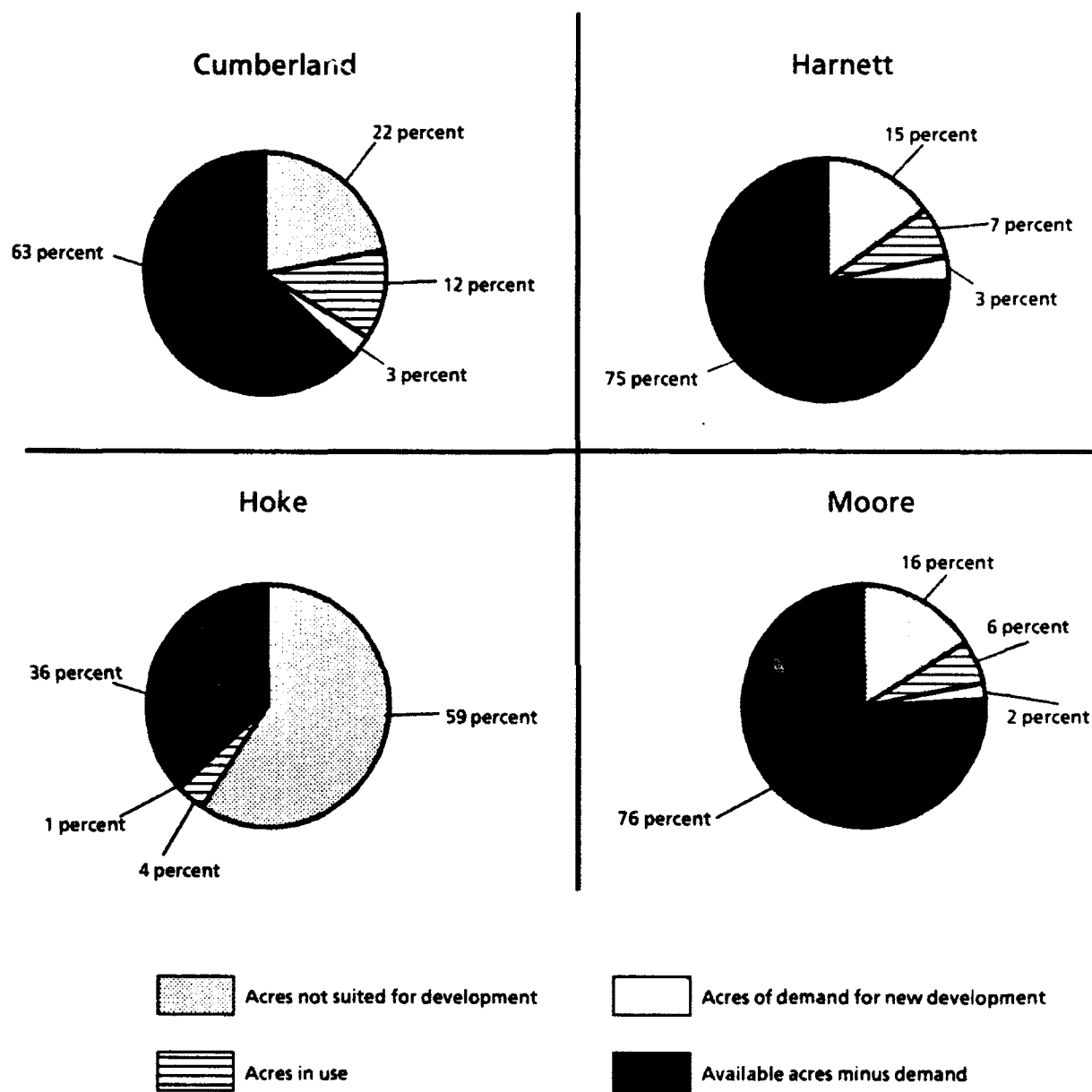


FIG. A-1. AVAILABILITY OF LAND BY COUNTY

**ANNEX A-2**

**DEMAND ANALYSIS FOR THE  
FORT BRAGG-POPE AFB IMPACT AREA**

## DEMAND ANALYSIS FOR THE FORT BRAGG – POPE AFB IMPACT AREA

### POPULATION PROJECTIONS

#### Use of State Projections

Population projections provided by the State of North Carolina for each of the four counties are based upon estimates for the years 2000 and 2010. A high (optimistic) projection and a low (conservative) projection are also provided. The high projection is 15 percent above the “most likely” state-developed scenario; the conservative estimate is 90 percent of the most likely scenario.

As shown in Table A-5, combined population in the four counties is expected to grow by 11.5 percent between the years 1990 and 2000, a somewhat slower rate than during the 1980s. Between the years 2000 and 2010, growth is expected to be 8.4 percent. About 61 percent of total population growth will be in Cumberland County.

**TABLE A-5**  
**POPULATION TRENDS AND PROJECTIONS**

County	1980	1990	% increase	2000 (projected)	% increase 1990 – 2000	2010 (projected)	% increase 2000 – 2010
Cumberland	247,160	274,566	11.1	304,680	11.1	328,052	7.7
Harnett	59,570	67,822	13.9	76,788	13.2	84,578	10.1
Hoke	20,383	22,856	12.1	25,455	11.4	27,529	8.1
Moore	50,505	59,013	16.8	66,259	12.3	71,356	7.7
Total impact area	377,618	424,257	12.4	473,182	11.5	511,515	8.4
State	5,880,950	6,628,637	12.7	7,226,000 <sup>a</sup>	9.0	7,739,000 <sup>a</sup>	7.0
U.S. (millions)	226.5	248.7	9.8	268.3	8.0	N/A	N/A

Source: U.S. Bureau of the Census, State of North Carolina.

<sup>a</sup> Series B, U.S. Bureau of the Census, *Projections of the Population of States*, p. 25, No. 1053, Jan 1990.

Population growth in the region results from a combination of natural increase (births exceeding deaths) and net immigration (more persons moving in than moving out of the region). In addition to natural increase, all four counties anticipate immigration during the next 2 decades to take advantage of increased job opportunities and to retire.

Independent of state projections, Cumberland County also applied several other approaches for estimating future population levels. Results of these estimates vary from below to above state projections. None of the other counties attempted to project future population growth independent of state estimates.

### **Impact of Military Bases on Population Growth**

State and Cumberland County projection methods do not distinguish between the civilian and military populations. Therefore, historical military base personnel growth is incorporated, at least partially, into the projections. On the basis of our premise that the military and on-base civilian worker population will remain stable for the next 20 years, nondirect DoD growth in Cumberland County is projected by the state to be 18.5 percent between 1990 and 2000 (see Table A-6). This population gain implies a rapid gain in jobs, sharply exceeding projected job growth for the State of North Carolina. In addition, state projections do not take into account relocation of off-base military families from Cumberland to other counties. For example, the projected 250 units of "801" housing will result in over 750 persons relocating to Hoke County primarily from Cumberland County. As a result of these factors, state projections for the county may not be reached unless some potential economic stimulus occurs. One possible economic stimulus is a rise in military personnel retirement.

### **HOUSEHOLD GROWTH PROJECTIONS**

The number of new households started in the four-county area in the 1990 to 2010 time frame will depend upon two factors:

- (1) New household formation evolving from the population already residing in the area, including civilian and retired military households
- (2) Immigration of households from other regions.

The methodology applied in this report estimates new household formations by changes in average household size. The average size has been declining for decades

**TABLE A-6**  
**POPULATION CHANGE BY COMPONENT – CUMBERLAND COUNTY**

	1980	1990	2000 (projected)	2010 (projected)	Percentage change		
					1980 – 1990	1990 – 2000	2000 – 2010
Military (all) <sup>a</sup>	89,912	89,675	87,682	85,690	0.3	- 2.2	- 2.3
Civilian on base <sup>b</sup>	7,554	7,541	7,374	7,206	0.2	- 2.2	- 2.3
Civilian (other) <sup>b</sup>	149,694	177,350	209,624	235,156	18.5	18.2	12.2
<b>Total</b>	<b>247,160</b>	<b>274,566</b>	<b>304,680</b>	<b>328,052</b>	<b>19.0</b>	<b>13.8</b>	<b>7.6</b>

**Note:** Military population estimated at 97,730 (1980) and 99,639 (1990)

<sup>a</sup> Allocated military population outside Cumberland County as follows. 8 percent (1980); 10 percent (1990); 12 percent (2000); and 14 percent (2010)

<sup>b</sup> Totals for 1980 and 1990 obtained from Bureau of the Census

as a result of economic, social, and demographic factors. For example, the share of the total population that the elderly population comprises has been rising; a greater number of elderly persons increases the number of one-person households. Higher divorce rates also increase one-person households. Finally, until recently, the birth rate has been declining, resulting in smaller families. The combination of these factors has led to the decline in the average household size.

Changes in household size between 1970 and 1990 in each of the counties, as well as projected changes in the 1990 through 2010 time frame, are shown in Table A-7. The rate of household size decline between 1980 and 1990 in the four-county region was considerably slower than the decline between 1970 and 1980. This pattern is consistent with national trends.

Discussions with the U.S. Bureau of the Census, with the State of North Carolina, and with planning personnel in the impact areas indicate that the rate of household size decline will slow further in the future; household size will stabilize within 20 years. Projected household size for the four counties, shown in Table A-7, takes into account national and state trends. These projections estimate that the average household size in the four counties will decline between 0.17 and 0.25 persons in the 1990 through 2010 time frame. Because much of Moore County's growth is projected to be from retirement, the average household size will decline to

**TABLE A-7**  
**CHANGE IN HOUSEHOLD SIZE, BY NUMBER OF OCCUPANTS**

County	Household size (occupants)					Change in household size		
	1970	1980	1990	2000 projected	2010 projected	1980 - 1990	1990 - 2000 projected	2000 - 2010 projected
Cumberland	3.46	2.98	2.77	2.66	2.60	-0.21	-0.11	-0.06
Harnett	3.50	2.83	2.60	2.48	2.42	-0.23	-0.12	-0.06
Hoke	4.00	3.28	2.92	2.74	2.66	-0.36	-0.18	-0.08
Moore	3.22	2.69	2.43	2.31	2.25	-0.26	-0.12	-0.06

2.25 persons. By comparison, Moore County had 3.22 persons in each household during 1970.

Applying these average household sizes to the existing and new population results in a projection of 44,792 new households in the four counties between 1990 and 2010 (see Table A-8). About three out of five of these new households will be in Cumberland County.

**TABLE A-8**  
**NUMBER OF HOUSEHOLDS BY COUNTY, 1980 TO 2010**

County	1980	1990	2000	2010	Growth 1990 - 2000	Growth 1990 - 2010	Percent of total region (1990 - 2010)
Cumberland	74,934	91,501	106,605	118,056	15,104	26,555	59.3
Harnett	20,148	25,150	29,951	33,671	4,801	8,521	19.0
Hoke	6,024	7,405	8,785	9,823	1,380	2,418	5.4
Moore	18,522	23,877	28,196	31,175	4,319	7,298	16.3
Total	119,628	147,933	173,537	192,725	25,604	44,792	100.0

## DEMAND FOR UNIMPROVED LAND

The demand for unimproved land consists of the following components: new household formation, reductions in the existing housing stock, vacant housing stock,

new building permits and changes in housing stock, and new nonresidential development and projections.

### **New Household Formation**

Each new household typically creates the need for an additional housing unit. Although some households "double up" temporarily (e.g., a newly married couple may live with their parents), over time there is a one-to-one relationship between changes in households and occupied housing units. The almost 45,000 additional households projected for the four counties are expected to create a demand for 45,000 new housing units by the year 2010 in the four-county region.

### **Reductions in Existing Housing Stock**

#### ***Cumberland County***

Over time, housing units are lost through demolition, disaster (such as flooding, fire), relocation to another community (particularly mobile homes), conversion to nonresidential use, and condemnation. In Cumberland County, most losses have resulted from redevelopment in older housing areas, demolition for highway right-of-way, and the relocation of mobile homes. Several census tracts in the county indicated declines in the number of single-family dwelling units between 1980 and 1989. Some of these reductions were attributable to redevelopment and were concentrated in the City of Fayetteville. However, it is unlikely that a high level of redevelopment activity will occur during the next decade.

The U.S. Bureau of the Census also estimated changes in existing housing stock for the period 1973 – 1981 at the national level. That survey found the decline in housing units in metropolitan areas of southern states to be 7.4 percent during the 9-year period, or about 0.8 percent per annum. At this annual rate, losses over a 20-year period would be about 17 percent. However, many (probably most) units that are lost through demolition or the relocation of mobile homes remain viable sites for housing construction. Therefore, the demand for new land is substantially smaller than the aggregate loss in housing inventory would suggest. For purposes of this analysis, we will assume that 0.3 percent of all 1990 housing units (or 295 units) are annually removed from the housing stock and require additional land. Sites for the balance of housing units removed from the housing stock would be used again by new permanent dwelling units or mobile homes. Applying these annual losses, demand



for housing units attributable to reductions in existing housing units would total about 5,900 units. Total housing demand due to new household formation and the reduction of existing units is 32,455 units.

### **Other Counties**

Although Moore County has a large rural component, there are relatively few mobile homes, and much of the housing stock is above average in quality. Therefore, the annual reduction in housing stock requiring new land is expected to be similar to Cumberland County, or about 0.3 percent.

Both Harnett and Hoke County are predominantly rural. Mobile homes constitute about one-third of the housing stock. Census data indicate that such areas have higher housing unit attrition when compared to urban areas. Therefore, annual losses for these two counties is estimated at 0.4 percent of the 1990 housing stock.

### **Vacant Housing Stock**

Typically, the number of dwelling units constructed exceeds total demand, resulting in housing vacancies. In 1990, about 7 percent of the total housing stock in the four-county area was vacant. We estimate total new construction to be 7 percent higher than the total number of new households to allow for vacancies. This will total 1.1 percent of the 1990 housing stock in the four counties.

### **New Building Permits and Changes in Housing Stock**

New building permits provide a measure of demand for residential units in the absence of physical counts. As shown in Table A-9, total housing stock changes measured by building permits are approximately the same as obtained by the *1990 Census of Population and Housing* and by a county inventory undertaken by Cumberland County. However, the distribution of housing stock by type varies. This may be attributable to definitional differences of what comprises mobile homes and multifamily dwelling units. The building permit data also suggest that virtually all building permits were used.

### **New Nonresidential Development and Projections**

An expansion of residential housing into previously undeveloped areas is typically followed by additional shopping centers, offices, and public facilities (such as schools and fire stations) to provide services to the new areas. These facilities tend

TABLE A-9

COMPARISON OF BUILDING PERMITS AFFECTING CHANGES IN HOUSING STOCK,  
CUMBERLAND COUNTY

	Single-family housing	Multi-family housing	Mobile home	Total
Building permits <sup>a</sup>	13,919	3,578	N/A	17,497
Census change in housing stock <sup>b</sup>	4,368	6,759	5,956	17,083
Cumberland County survey <sup>c</sup>	12,055	4,016	1,719	17,790

<sup>a</sup> January 1981 to December 1990. From: *Fayetteville Urbanized Area and Cumberland County, Population and Economic Study*, Cumberland County Planning Board, February 1991.

<sup>b</sup> May 1980 compared to May 1990.

<sup>c</sup> May 1980 compared to December 1989.

to be substantially less land-intensive than residential housing, particularly in low-density housing neighborhoods. For purposes of this analysis, we will assume that one acre of such development is required for every seven acres of moderate density (one-half to one unit per acre) residential development. This assumption is based upon the ratio of residential to commercial property. Therefore, one needs to add 15 percent to the land area required for housing to obtain the total demand for unimproved land. Low housing density areas are estimated to require about 10 percent additional land for nonresidential development.

The total number of housing units projected to be constructed in each of the four counties is shown in Table A-10.

The total number of dwelling units in the four-county area will rise by 58,341, with 77 percent of the demand attributable to new household formation and most of the balance to replacement of existing units. The average annual rate of construction is over 2,900 units. However, actual construction rates in any given year will depend upon local economic conditions. The Cumberland County construction rate is projected to be 1,716 per year. The actual number of building permits in 1991, the first projected year in Cumberland County, was 1,593, or 93 percent of the projected total. Because 1991 was a recession year, one would expect construction levels to be below average.

**TABLE A-10**  
**PROJECTED TOTAL NEW CONSTRUCTION, 1990 TO 2010**

County	New households	Housing stock reduction	Vacant housing stock <sup>a</sup>	Total	Per annum
Cumberland	26,555	5,902	1,859	34,316	1,716
Harnett	8,521	2,231	596	11,348	567
Hoke	2,418	640	169	3,227	161
Moore	7,298	1,641	511	9,450	472
Total	44,792	10,414	3,135	58,341	2,916

<sup>a</sup> Seven percent of new households.

## DISTRIBUTION OF HOUSING UNITS

To determine the impact, if any, associated with limiting land use in noise zones, and to assess the likely fiscal impact of potential land use constraints, it is necessary to distribute projected new housing units by area within each of the four counties.

### Distribution of Existing Units by Type

The distribution of existing units by type and median value in 1980 and 1990 is shown in Table A-11. These data indicate that Moore County had the highest percentage rise in housing units during the 1980s, followed by Harnett County. Median home values have risen most rapidly in Hoke County, followed by Moore County.

An examination of housing distribution in 1990 by the number and type of units in the four counties and county subareas indicates that the City of Fayetteville has very few mobile homes but substantial numbers of multiple-unit housing when compared to other areas. Pinehurst and Southern Pines have virtually no mobile homes. Almost 20 percent of the total housing stock in the four counties are mobile homes, somewhat higher than the state average.

Between 60 percent and 73 percent of all housing units in these counties are single-family attached and detached permanent homes (including manufactured

TABLE A-11

## DISTRIBUTION OF HOUSING UNITS BY TYPE, 1980 TO 1990

County	1980	1990	Change in units	Percentage change
<b>Cumberland</b>				
Total units	81,269	98,360	17,091	21.0
Occupied units	74,934	91,500	16,566	22.1
Single units <sup>a</sup>	62,110	66,478	4,368	7.0
Mobile homes	8,940	14,896	5,956	66.6
Two or more units	10,227	16,986	6,759	66.1
Median value	\$37,100	\$63,500	\$26,400	71.2
<b>Harnett</b>				
Total units	22,175	27,896	5,721	25.8
Occupied units	20,148	25,150	5,002	24.8
Single units <sup>a</sup>	16,673	17,153	480	2.9
Mobile homes	3,983	8,557	4,574	114.8
Two or more units	1,519	2,186	667	43.9
Median value	\$31,000	\$50,800	\$19,800	63.9
<b>Hoke</b>				
Total units	6,470	7,999	1,529	23.6
Occupied units	6,024	7,405	1,381	22.9
Single units <sup>a</sup>	4,739	4,802	63	1.3
Mobile homes	1,271	2,906	1,635	128.6
Two or more units	460 <sup>a</sup>	291 <sup>a</sup>	N/A	N/A
Median value	\$34,400	\$65,700	\$31,300	91.0
<b>Moore</b>				
Total units	21,048	27,358	6,310	30.0
Occupied units	18,582	23,877	5,295	28.5
Single units <sup>a</sup>	16,369	19,540	3,171	19.4
Mobile homes	2,382	4,846	2,464	103.4
Two or more units	2,297	2,972	675	29.4
Median value	\$44,400	\$80,300	\$35,900	80.9

Source: 1980 and 1990 Census of Population and Housing.

<sup>a</sup> Attached and detached housing units.

houses). The second largest (15.1 percent) housing category are mobile homes. The 1990 Census found that 15.1 percent of all homes in Cumberland County fit this category, slightly higher than the 14.5 percent shown in a housing survey undertaken by the county. The highest concentration of these homes is in Hoke County, followed by Harnett County. The number of mobile homes according to the Census has been rising more rapidly than other homes, although the definition of mobile homes has been blurred in recent years by manufactured homes brought by truck to a site. Mobile homes and manufactured homes are typically at the low end of assessed values. (Mobile homes are assessed as personal property but at the same tax rate as other housing in the four counties.)

The proportion of mobile homes will stabilize during the next 20 years. For purposes of this analysis, it is assumed that the proportion of mobile homes will remain essentially stable.

The percentage of multiple-family homes in 1990 ranged from 3.7 percent in Hoke County to 17.3 percent in Cumberland County. The percentage of such homes is likely to rise somewhat in all counties as a result of rising land prices, additional sewage treatment facilities, and increased urbanization. However, the dominant share of housing will remain single-family detached units because much land is available and the price of land is relatively low.

### **Existing Housing Units at the Township Level**

#### ***Harnett County***

North Carolina counties are subdivided into townships, which include incorporated cities, towns, and villages. Associated with each township are area (square miles and acres) owner-occupied housing values (i.e., low, medium, and high); type of unit (i.e., single, multifamily, and mobile homes); and density (housing units per acre and persons per square mile). These data are shown for Harnett, Hoke, and Moore counties in Tables A-12, A-13, and A-14, respectively. In Harnett County, housing is distributed at low density across townships. There are only .073 units per acre in the county, or about one unit per every 13 acres. Mobile homes are concentrated in Anderson Creek Township; relatively expensive homes are concentrated in Barbecue Township.

TABLE A-12

## HARNETT COUNTY HOUSING ALLOCATION

Township name	Square miles	Gross acres	Home values			Number of units				Units per acre	Persons per square mile
			Low	Median	High	Single-family housing	Multi-family housing	Mobile homes	Total		
Anderson Creek	66.4	42,496	\$39,800	\$56,700	\$68,900	1,198	398	2,509	4,105	.096	142.1
Barbecue	58.9	37,696	41,800	63,100	91,800	1,026	5	637	1,668	.044	63.0
Black River	29.0	18,560	43,600	61,500	77,300	1,396	225	570	2,191	.118	181.9
Buckhorn	28.5	18,240	40,100	60,200	82,800	285	2	203	490	.026	43.1
Duke	18.1	11,584	26,300	38,700	55,100	1,988	144	353	2,485	.214	305.6
Erwin	3.3	2,113	25,600	36,900	50,400	1,571	133	187	1,891	.861	1,230.6
Grove	53.3	34,112	35,800	48,600	68,000	2,037	80	931	3,048	.089	138.4
Hector's Creek	36.0	23,040	43,000	63,100	86,200	558	4	227	789	.034	54.8
Johnsonville	64.9	41,536	32,400	45,700	66,300	549	10	678	1,237	.029	46.0
Lillington	27.4	17,536	35,200	49,700	71,000	986	169	336	1,491	.085	145.1
Neills Creek	32.5	20,800	44,700	63,300	96,000	978	182	387	1,547	.074	144.5
Stewarts Creek	49.8	31,872	25,200	42,000	59,000	736	3	379	1,118	.035	60.8
Upper Little River	95.0	60,800	34,200	52,500	72,500	1,388	11	768	2,167	.035	57.9
Averasboro	35.3	22,592	36,400	50,800	72,300	4,028	959	579	5,566	.246	371.1
Total	595.0	380,800	\$35,200	\$50,800	\$71,700	17,153	2,186	8,744	29,787	.073	114.0

**Hoke County**

Hoke County consists of over 250,000 acres. However, Fort Bragg includes 89,344 of these acres, and terrain in the southern part of Hoke County is mostly undesirable from a land development perspective. The large number of mobile homes has a depressing effect upon average house values in each of the townships. Most homes in the lower quartile are valued at less than \$30,000.

**Moore County**

Moore County differs from the other communities in the region because it includes a substantial number of expensive homes, occupied primarily by retired persons. The highest housing values are in Pinehurst (where the average unit in the

TABLE A-13

## HOKE COUNTY HOUSING ALLOCATION

Township name	Square miles	Gross acres	Home values			Number of units				Units per acre	Persons per square mile
			Low	Median	High	Single-family housing	Multi-family housing	Mobile homes	Total		
Allendale	23.7	15,168	\$15,000	\$31,300	\$55,000	75	1	46	122	.01	15.1
Antioch	36.0	23,040	22,600	35,300	52,000	546	70	384	1,000	.04	80.9
Blue Springs	32.0	20,480	27,600	39,900	64,100	245	2	141	N/A	.02	36.6
Fort Bragg	139.6	89,440	N/A	N/A	N/A	N/A	N/A	N/A	388	N/A	N/A
McLaughlin	35.1	22,464	43,000	59,300	81,900	715	12	883	1,610	.07	116.7
Quewhiffle	54.8	35,072	31,600	50,900	70,200	547	6	374	927	.03	64.7
Raeford	37.1	23,744	29,800	43,600	63,500	2,317	197	899	3,413	.14	249.5
Stonewall	32.9	20,936	29,600	42,708	62,700	357	3	179	539	.03	46.0
Total	391.2	250,340	N/A	N/A	N/A	4,802	291	2,906	7,999		
Average	N/A	N/A	\$30,100	\$44,800	\$65,700	N/A	N/A	N/A	N/A	N/A	58.4

top quartile is valued at \$230,900 and Whispering Pines (top quartile value is \$166,100). High-income housing is concentrated in the McNeil and Mineral Springs Townships.

## DISTRIBUTION OF PROJECTED HOUSING UNITS

## Cumberland County

The methodology used for assessing allocation for the distribution of housing by value in Cumberland County required the following steps:

- (1) The Cumberland County housing unit estimates for the year 2010 were increased to include additional households and the demand attributable to existing housing stock removal. This allocation methodology led to an increase in required units from 20,972 units (projected by the county) to 32,455 units (more than a 50 percent increase).
- (2) Total new housing units were allocated to each planning district in proportion to the allocation by Cumberland County.

**TABLE A-14**  
**MOORE COUNTY, HOUSING ALLOCATION**

Township name	Square miles	Gross acres	Home values			Number of units				Units per acre	Persons per square mile
			Low	Median	High	Single-family housing	Multi-family housing	Mobile homes	Total		
Carthage (Twp 1)	97.6	62,464	\$33,400	\$49,900	\$70,200	1,416	54	539	2,009	.032	49.8
Bensalen (2)	99.8	63,872	24,100	40,400	59,300	829	N/A	401	1,230	.019	30.4
Sheffields (3)	72.1	46,144	25,300	41,000	59,400	1,476	44	612	2,132	.046	71.3
Ritters (4)	50.0	32,000	22,300	41,600	60,100	716	9	294	1,019	.032	47.9
Deep River (5)	41.4	26,496	30,000	41,700	57,500	122	1	65	188	.007	9.9
Greenwood (6)	42.3	27,072	35,300	51,400	69,100	609	1	385	995	.369	55.7
McNeil (7)	80.1	51,264	52,800	84,100	127,500	4,679	1,225	718	6,622	.129	170.5
Sand Hill (8)	82.9	53,056	47,500	74,600	115,600	3,932	668	881	5,481	.103	155.4
Mineral Springs (9)	100.3	64,192	86,800	132,100	186,200	5,182	959	601	6,742	.105	123.5
Little River (10)	32.2	20,608	44,800	89,600	164,700	579	11	350	940	.045	58.6
<b>Total</b>	<b>698.7</b>	<b>447,168</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>19,540</b>	<b>2,972</b>	<b>4,846</b>	<b>27,358</b>	<b>N/A</b>	<b>N/A</b>
<b>Average</b>	<b>N/A</b>	<b>N/A</b>	<b>\$46,400</b>	<b>\$80,300</b>	<b>\$134,200</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>.061</b>	<b>84.4</b>
<b>Towns</b>											
Pinehurst (9)	9.0	5,760	\$116,900	\$156,700	\$230,900	2,275	800	59	3,134	.41	533
Balance of Mineral Springs (9)	91.3	58,432	N/A	N/A	147,340	2,907	154	542	3,608	.062	N/A
Southern Pines (7)	7.8	4,992	49,100	73,800	100,900	2,196	1,043	69	3,308	.66	853
Whispering Pines (7)	2.5	1,600	108,900	137,000	166,100	690	27	2	719	.45	497
Balance of McNeil (7)	68.6	43,904	42,014	74,474	150,749	1,793	155	647	2,595	.059	N/A

- (3) The county housing unit distribution by value (i.e., low, median, and high) was modified to more closely follow a normal distribution pattern. As such, the proportion of housing of above-average value was set at 30 percent of all new housing stock, housing of average value at 55 percent, and housing of below-average value at 15 percent. The below-



average housing allocation takes into account the fact that during the next 20 years, Cumberland County expects few new public housing projects and somewhat fewer additional mobile homes than are currently present in the county. Public housing and mobile homes form a large current share of low-cost housing in the area.

- (4) The average value for each category of housing is based on quartile-value data for owner-occupied units from the *1990 Census of Population and Housing*. These Census housing values are approximately 20 percent higher than 1988 assessed values derived from county assessment records.
- (5) The projected values of housing units in each planning district by category follow the same relative patterns as estimated by the county, but the distribution of values has been modified to be consistent with the percentage distributed by value for the total county.

### **Other Counties**

The projected distribution of housing units by value for the counties is shown in Table A-15. The allocation of future housing by planning district in Cumberland County is shown in Table A-16. As these data show, the majority of new housing will be in Planning Districts 4 and 6. These Districts are areas of Cumberland County that developed rapidly during the 1970s and 1980s.

#### **Moore County**

Because Moore County anticipates substantial additional housing to be constructed in the moderate-to-high-income retirement communities, the proportion of expensive housing to be built is expected to be somewhat higher than the current 25 percent share. Therefore, we are allocating 30 percent of the new housing stock with an average value equal to the highest value quartile in 1990. Concurrently, the proportion of future housing in the lowest 1990 quartile is reduced from 25 percent to 20 percent.

#### **Harnett County**

In 1990, over 30 percent of the housing stock was mobile homes, which comprised most of the lowest quartile value housing in the county. It is assumed that new housing will follow the same distribution as the 1990 housing inventory. Therefore, 25 percent of all new units are designated as below average, 50 percent as average, and 25 percent as above average.

TABLE A-15

## DISTRIBUTION OF NEW HOUSING: 1990 TO 2010, BY AVERAGE VALUE

Category	Number of units	Percentage of total	Average assessed value (in 1990 dollars)	Tax rate	Revenue per unit
Cumberland County					
Low	4,868	15.2	49,100	.725	356
Medium	17,850	54.9	63,500	.725	460
High	9,717	29.9	83,000	.725	602
Total	32,435	100.0	—	—	—
Harnett County					
Low	2,688	25.0	35,200	.73	257
Medium	5,377	50.0	50,800	.73	371
High	2,688	25.0	71,700	.73	523
Total	10,753	100.0	—	—	—
Hoke County					
Low	1,131	37.0	30,100	.87	262
Medium	1,280	41.9	44,800	.87	390
High	647	21.1	65,700	.87	572
Total	3,058	100.0	—	—	—
Moore County					
Low	1,788	20.0	46,400	.42	195
Medium	4,470	50.0	80,300	.42	337
High	2,682	30.0	134,200	.42	564
Total	8,940	100.0	—	—	—

**Hoke County**

Hoke County has the largest share of mobile homes as a percentage of all housing in the region; this pattern is likely to continue. Therefore, 37 percent of the new housing stock is designated as below average, with the balance allocated as two-thirds average, and one-third as above average in value.

TABLE A-16

**DISTRIBUTION OF NEW HOUSING IN CUMBERLAND COUNTY: 1990 TO 2010, BY  
PLANNING DISTRICT AND VALUE**

Planning District	Housing units by value				Percentage of Cumberland County
	High	Moderate	Low	Total	
1	1,204	2,332	1,096	4,632	13.5
2	66	64	345	475	1.4
3	1,338	2,268	752	4,358	12.7
4	3,137	6,192	309	9,638	28.1
5	421	103	1,457	1,981	5.8
6	2,519	5,029	596	8,144	23.7
7	1,370	2,542	386	4,298	12.5
8	0	0	0	0	0.0
9	246	338	206	790	2.3
Total	\$10,301	\$18,868	\$5,147	\$34,316	100.0
Percentage of all housing	30.0%	55.0%	15.0%	100.0	—

### Current and Projected Housing Density

The average housing density in the four-county area is very low. As shown in Table A-17, there is roughly one dwelling unit for every 4 acres in Cumberland County (the most densely populated area) and one unit for every 31 acres in Hoke County. However, existing housing covers only a small percentage of the land area. If the average dwelling unit occupies one-half acre in Cumberland County and 1 acre in other counties, the total developed area in Cumberland County would include less than 12 percent of the total land area. In Hoke County, only 3 percent of the area would be improved. These data represent gross acreage. In reality, parts of each county cannot be developed for any of the following reasons: the land is already developed, the government owns the land, the soil conditions are poor, the land is in flood plains, the terrain is steep, rivers are nearby. Other barriers to economically viable development also exist.

**TABLE A-17**  
**HOUSING DENSITY – 1990**

County	Number of acres	Number of dwelling units	Units per acre
Cumberland	417,920	98,360	0.235
Harnett	380,800	27,896	0.073
Hoke	250,240	7,999	0.032
Moore	447,360	27,318	0.061

### **DISTRIBUTION OF PROJECTED DEMAND FOR LAND – GROWTH AREAS**

Given total projected demand for housing and the characteristics of existing housing stock at the township level, the next step is to distribute new housing into areas most likely to be developed during the next 2 decades. The methodology used for assessing allocation of new housing required the following steps:

- (1) Potential areas for development were identified. Meetings were held with local planners to establish areas within each of the counties that were (a) most likely to develop over the next decade (primary development areas); (b) likely to develop, but at a lower overall density (secondary development areas); (c) developable with little development pressure; and (d) not developable, or with limited development potential because of natural or other barriers. During these discussions, the following factors were identified on topographic maps: the likely level of development (i.e., number of new units) in areas identified, the availability of sewage treatment and central water facilities, and the causes for development pressures in given areas.
- (2) Each of the county areas identified in categories (1)(a) or (1)(b) above was allocated a number of dwelling units likely to be constructed over the next 20 years – based upon data provided by each county and our estimate of total demand at the county level. The value of units projected to be constructed was based upon county estimates (when available). In other instances, the allocation was based primarily on the distribution of current housing stock value.
- (3) The current number of dwelling units in each subarea was estimated as a share of township unit totals based upon either the proportion of the sub-area land area, the township total, or by the use of U.S. Geological Survey

maps, which identify each housing unit outside highly urbanized areas. The numbers were adjusted upward to take into account the fact those maps were based mostly on aerial photographs taken in the mid-1980s.

- (4) The acreage estimations used by existing and future housing units were based primarily on whether existing sewage treatment facilities were available; the value of projected housing, terrain, and proximity to urbanized areas; and an examination of development patterns (housing density) shown on topographical maps.
- (5) A proportion of the land within each developable subarea was excluded as not being developable as a result of characteristics such as the presence of lakes, rivers, steep terrain, and swamps. Typically, between 10 percent and 20 percent of the land was excluded on this basis.
- (6) In addition to land required for housing, additional acreage was allocated for infrastructure (such as roads), public facilities (such as schools), and commercial development (such as shopping centers and office buildings). The amount of land allocated for these purposes varied between 10 percent and 25 percent of the total land requirements for residential structures. The actual percentages depended upon such factors as housing density and the level of urbanization in a given area.
- (7) Housing demand not allocated to specific development subareas was allocated to category (1)(c) above – “developable land with little development pressure.” (In a typical county, a certain percentage of new housing construction takes place randomly as individual property owners decide to build on their land.)
- (8) Subtracting land required for housing and other needs from available net unimproved land leaves the quantity of land available for future development (beyond the 20-year projection period).

**ANNEX A-3**

**METHODOLOGY AND ASSUMPTIONS FOR ESTIMATING  
EXISTING AND PROJECTED LAND USE  
FOR THE FOUR COUNTIES**

## **METHODOLOGY AND ASSUMPTIONS FOR ESTIMATING EXISTING AND PROJECTED LAND USE FOR THE FOUR COUNTIES**

### **SPECIAL CUMBERLAND COUNTY DISTRIBUTION AND HOUSING ALLOCATION**

The special methodology used to determine new and total housing units strictly in Cumberland County in the year 2010 required completion of the following:

- (1) Population in the year 2010 is estimated based on projections made by the State of North Carolina. The population gain between 1990 and 2010 is projected to be about 53,500.
- (2) The number of new household formations based on the year 2010 population is derived from estimated 2010 household size. The size per occupied dwelling unit is based on national, North Carolina, and Cumberland County trends and projections. The average household size is expected to decline from 2.77 in 1990 to 2.66 in 2000, and 2.60 in 2010.
- (3) The 2010 population (noninstitutionalized) and a household density of 2.60 results in 26,528 new households during the 20-year period. The average household size includes all (existing and new) housing.
- (4) In addition to the 26,528 units required to meet housing needs of new households, reductions in existing housing stock and vacant new housing stock will increase the demand for housing to 34,316 units. This includes an additional 25,125 units of single-family housing and 3,094 units of multiple-family housing.

The 34,366 housing units added to Cumberland County were allocated by census track and planning district by completing the following steps:

- (1) An initial allocation of housing units by census track is based on the Cumberland County allocation of new units by census track. A total of 19,539 occupied units were allocated by planning district. The housing distribution, by type, was the same as in 1990.
- (2) The year 2000 population residing in the new dwelling units was calculated on the projected number of persons per dwelling unit. Each unit type was adjusted to reflect the average rate of change in household size for all units in the county.
- (3) The percentage of the total population in new dwelling units in each census track was computed. This percentage was the basis for Logistic

Management Institute's allocation of the "occupied" and "total" number of dwelling units (by census track).

- (4) Application of the methodology described above resulted in a total occupied unit population in the year 2010 of 306,818 persons living in occupied dwelling units.

The distribution of housing units and population in Cumberland County is shown in Table A-18. The average density in the year 2010 in units already occupied in 1990 is 2.588. The density of new dwelling units in 1990 is higher: 2.636. This reflects differences in persons per dwelling unit in growing census tracks and those with little growth between 1980 and 1990. As such, the number of dwelling units in these census tracks is somewhat less than derived by applying countywide average density by type of unit. Note that the next section provides more information about Cumberland County.

**TABLE A-18**

**CHANGE IN POPULATION AND OCCUPIED HOUSING  
UNITS IN CUMBERLAND COUNTY, 1990 TO 2010**

Area/year	Total occupied unit population	Institution population	Total population	No. occupied units	Average units per acre
Total housing (1990)	253,362	21,204	274,566	91,500	2.769
New housing (1990)	70,052	0	70,052	26,579	2.636
Existing housing (2010)	236,796	21,204	257,996	91,500	2.588
Total housing (2010)	306,818	21,204	328,052	118,078	2.599



## **METHODOLOGY AND ASSUMPTIONS FOR ALL COUNTIES**

The assumptions made for estimating existing and projected land use in all counties are described, by county, in the paragraphs below.

**Cumberland County** (*Note: Subarea codes match County Planning District codes.*)

### ***CU-1. Planning District 1 (Secondary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. Residential acreage for existing units is increased by 15 percent to account for infrastructure and other uses.
3. The acreage for new units is assumed to be the same as for existing units.
4. The demand is allocated based on the existing county proportions of low-, medium-, and high-value housing units.
5. The density for both existing and new units is assumed to be one acre per unit.

### ***CU-2. Planning District 2 (Undevelopable Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. Density for both existing and new units is assumed to be one acre per unit.

### ***CU-3. Planning District 3 (Secondary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one per half acre for medium- and high-, and one per acre for low-value housing units.

***CU-4. Planning District 4 (Primary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be three per acre for high-, medium-, and low-value units.

***CU-5. Planning District 5 (Secondary Growth Area)***

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage used by existing units is increased by 40 percent to account for infrastructure and other uses.
3. The acreage for new units is increased by 25 percent to account for infrastructure and other uses.
4. The density for existing units is assumed to be two per acre for high-, five per acre for medium-, and seven per acre for low-value housing units.
5. The density for new units is assumed to be three per acre for high-, six per acre for medium-, and eight per acre for low-value housing units.

***CU-6. Planning District 6 (Primary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The density for both existing and new units is assumed to be four and one-third per acre for high- and medium-, and four per acre for low-value housing units.

***CU-7. Planning District 7 (Primary Growth Area)***

1. Developable land is assumed at 85 percent of total land area.
2. The acreage for existing units is increased by 30 percent to account for infrastructure and other uses.

3. The acreage for new units is increased by 20 percent to account for infrastructure and other uses.
4. The density for existing units is assumed to be three per acre for high-, four per acre for medium-, and two per acre for low-value housing units.
5. The density for new units is assumed to be three per acre for high-, four per acre for medium-, and two per acre for low-value housing units.

***CU-8. Planning District 8 (Fort Bragg is not included in this analysis.)***

***CU-9. Planning District 9 (Primary Growth Area)***

1. Developable land is assumed at 85 percent of total land area.
2. The acreage for both existing and new units is increased by 20 percent to account for infrastructure and other uses.
3. The density for existing units is assumed to be three per acre for high-, four per acre for medium-, and four per acre for low-value housing units.
4. The density for new units is assumed to be three per acre for high-, four per acre for medium-, and six per acre for low-value housing units.

**Harnett County (Note: Subarea codes identify county growth areas.)**

***HA-1. (Primary Growth Area)***

1. Developable land is assumed to be 80 percent of total land area.
2. The acreage for existing units is increased by 15 percent to account for infrastructure and other uses.
3. The acreage for new units is assumed to be the same as for existing units.
4. The demand allocation is based on county proportions of low-, medium-, and high-value housing units.
5. The density for existing units is assumed to be one and one-half per acre for high-, one per acre for medium-, and one per acre for low-value housing units.
6. The density for new units is assumed to be one and one-half per acre for high-, one per acre for medium-, and one per acre for low-value housing units.
7. This area is defined to include Buckhorn, Hector's Creek, and Black River Townships. The growth area is defined as 90 percent of the three-township total land area and is allocated with similar existing housing units.

***HA-2. (Primary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 20 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for existing units is assumed to be one-half per acre for high-, one-third per acre for medium-, and one-fifth per acre for low-value housing units.
5. The density for new units is assumed to be the same as for existing units.
6. This area is defined to be 8.3 percent of the Neills Creek Township total area and is allocated with the same percent for existing housing units.

***HA-3. (Secondary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.

2. The acreage for both existing and new units is increased by 20 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be three-quarters per acre for high-, one-third per acre for medium-, and one-half per acre for low-value housing units.
5. This combined area is defined to be 66 percent of Grove, 60 percent of Duke, and 33 percent of Averagesboro Townships. It is assumed that one-half of all existing units are in this area.

**HA-4. (Secondary Growth Area)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 20 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one and one-half per acre for high- and one per acre for medium- and low-value housing units.
5. This area is defined to be 20 percent of Stewarts Creek Township's land area, with the same proportion allocated to existing housing units.

**HA-5. (Primary Growth Area)**

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one and one-half per acre for high- and one per acre for medium- and low-value housing units.
5. This area is defined to be 50 percent of Anderson Creek Township, with the same proportion allocated to existing housing units.

**HA-6. (Primary Growth Area)**

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one per acre for high-, one-half per acre for medium-, and one per acre for low-value housing units.
5. The area is defined to be about 7 percent of Johnsonville, Barbecue, and Anderson Creek Townships, with the same proportion allocated to existing housing units.

**HA-7. (Primary Growth Area)**

1. Developable land is assumed to be 80 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for existing units is assumed to be one per acre for high- and low- and three-quarters per acre for medium-value housing units.
5. The density for new units is assumed to be three-quarters per acre for high-, one-half per acre for medium-, and one per acre for low-value housing units.
6. This area is defined to be 15 percent of Johnsonville's and 10 percent of Barbecue Township's land areas. The same proportion is allocated to existing housing units. This assumed number is adjusted downward for low-cost housing. Only 10 percent of the total low-cost housing is allocated there, based on the characteristics of existing housing in that area.

**HA-8. (Secondary Growth Area)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.

4. The density for both existing and new units is assumed to be one and one-half per acre for high- and one per acre for medium- and low-value housing.
5. About 80 percent of this area is in Barbecue Township; the remainder is in Johnsonville Township. The land area it takes is about 50 percent of Barbecue Township. The same proportion is allocated to existing housing units.

**HA-9. (Balance of County)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one unit per acre.
5. This area is defined to exclude previously defined growth areas and urban areas in the remainder of Harnett County.

**Hoke County (Note: Subarea codes identify county growth areas.)**

***HO-1. (Primary Growth Area)***

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage for existing units is increased by 20 percent to account for infrastructure and other uses.
3. The acreage for new units is assumed to be the same as for existing units.
4. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
5. The density for existing units is assumed to be one per acre for high-, one-half per acre for medium-, and one-half per acre for low-value housing units.
6. The density for new units is assumed to be three-quarters per acre for high-, one-half per acre for medium-, and one-quarter per acre for low-value housing units.
7. This area is defined to be about 50 percent of McLaughlin Township development, with the same proportion allocated to existing housing units.

***HO-2. (Secondary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The demand allocation is based on county proportions of low-, medium-, and high-value housing units.
4. The density for existing units is assumed to be one per acre for high-, medium-, and low-value housing units.
5. The density for new units is assumed to be one per acre for high- and low- and three-quarters per acre for medium-value housing units.
6. The area is defined to be about 35 percent of McLaughlin Township development, with the same proportion allocated to existing housing units.

***HO-3. (Primary Growth Area)***

1. Developable land is assumed to be 90 percent of total land area.
2. Residential acreage for existing units is increased by 10 percent for infrastructure and other uses.



3. The acreage for new units is increased by 15 percent to account for infrastructure and other uses.
4. The demand allocation is based on county proportions of low-, medium-, and high-value housing units.
5. The density for existing units is assumed to be one per acre for high-, medium-, and low-value housing units.
6. The density for new units is assumed to be one per acre for high-, one-half per acre for medium- (one-eighth per acre for planned "801" housing), and one-quarter per acre for low-value housing units.
7. It is assumed that 70 percent of the existing units are located in Raeford Township, an urbanized area. It is assumed that 15 percent of all development outside the city limits will take place in this area.

#### ***HO-4. (Secondary Growth Area)***

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage for both existing and new units is increased by 10 percent to account for infrastructure and other uses.
3. The demand allocation is based on county proportions of low-, medium-, and high-value housing units.
4. The density for both existing and new units is assumed to be one and one-half per acre for low-, medium-, and high-value housing units.
5. The area is defined as approximately 50 percent of Blue Springs Township, with this same proportion applied to the distribution of existing housing units.

#### ***HO-5. (Secondary Growth Area)***

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 10 percent to account for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. The density for existing units is assumed to be one and one-half per acre for high-, medium-, and low-value housing units.
5. The density for new units is assumed to be one per acre for high-, medium-, and low-value housing units.

6. It is assumed that 70 percent of all existing development is in the city of Raeford, with the remaining 30 percent outside that area.

**HO-6. (Balance of County)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
4. Density for both existing and new units is assumed to be one-quarter per acre for high-, medium-, and low-value housing units.
5. This area is defined to include the balance of developable land in Hoke County and excludes state-owned lands, agricultural areas, and other areas limited by topographic features such as soil conditions, etc.

**Moore County (Note: Subarea codes identify county growth areas.)**

***MO-1. (Whispering Pines)***

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage required for existing units is increased by 15 percent to account for infrastructure and other uses.
3. The acreage for new units is assumed to be the same as for existing housing units.
4. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
5. The density for existing units is assumed to be one-half per acre for high- and one-quarter per acre for medium- and low-value housing units.
6. This area is defined to include the urbanized area of Whispering Pines.

***MO-2. (Primary Growth Area)***

1. Developable land is assumed to be 70 percent of total land area.
2. The acreage for existing units is increased by 10 percent to account for infrastructure and other uses.
3. The acreage for new units is increased by 15 percent for infrastructure and other uses.
4. The demand is allocated based on county proportions of low-, medium-, and high-value housing units.
5. The density for both existing and new units is assumed to be one and one-half per acre for high-, medium-, and low-value housing units.

***MO-3. (Primary Growth Area, Wood Lake)***

1. Developable land is assumed to be 30 percent of total land area.
2. The residential acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The density for both existing and new units is assumed to be one-half per acre for both high- and medium-value housing units.
4. The projected demand for the area is based on planning estimates and the recent rate of unit development.

**MO-4. (Primary Growth Area)**

1. Developable land is assumed to be 85 percent of gross land area.
2. The residential acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The density for existing units is assumed to be two per acre for medium- and low-value housing units.
4. The density for new units is assumed to be one per acre for medium- and low-value housing units.

**MO-5. (Secondary Growth Area)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The density for existing units is assumed to be two per acre for both medium- and low-value housing units.
4. The density for new units is assumed to be one per acre for both medium- and low-value housing units.

**MO-6. (Primary Growth Area, Horse Country)**

1. Developable land is assumed to be 85 percent of total land area.
2. The residential acreage for both existing and new units is increased by 10 percent for infrastructure and other uses.
3. The density for existing units is assumed to be three acres per unit.
4. The density for new units is assumed to be six acres per unit.

**MO-7. (Primary Growth Area)**

1. Developable land is assumed to be 75 percent of total land area.
2. The acreage for both existing and new units is increased by 10 percent for infrastructure and other uses.
3. The density for existing units is assumed to be five per acre for both high- and medium-value housing units.
4. The density for new units is assumed to be three per acre for medium-value housing units.

**MO-8. (Secondary Growth Area)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 10 percent for infrastructure and other uses.
3. The density for both existing and new units is assumed to be one per acre for high- and one-half per acre for medium-value housing units.

**MO-9. (Primary Growth Area, Southern Pines)**

1. Developable land is assumed to be 80 percent of total land area.
2. The acreage for existing units is increased by 20 percent for infrastructure and other uses.
3. The acreage for new units is increased by 15 percent for infrastructure and other uses.
4. The density for both existing and new units is assumed to be one-half per acre for high-, one-fifth per acre for medium-, and one-quarter per acre for low-value housing units.

**MO-10. (Primary Growth Area)**

1. Developable land is assumed to be 80 percent of gross land area.
2. The acreage for both existing and new units is increased by 15 percent for infrastructure and other uses.
3. The density for both existing and new units is assumed to be one per acre for high-, one-half per acre for medium-, and one-quarter per acre for low-value housing units.
4. This area is defined to include 55 percent of Sand Hill Township, including Aberdeen and Pine Bluff. The existing area and units are allocated by these same proportions.

**MO-11. (Primary Growth Area, Pinehurst)**

1. Developable land is assumed to be 75 percent of total land area.
2. The acreage for existing units is increased by 20 percent for infrastructure and other uses.
3. The acreage for new units is increased by 15 percent for infrastructure and other uses.

4. The density for existing units is assumed to be three-quarters per acre for high-, one-fifth per acre for medium-, and one-quarter per acre for low-value housing units.
5. The density for new units is assumed to be one per acre for high- and one-fifth per acre for medium-value housing units.

**MO-12. (Balance of County)**

1. Developable land is assumed to be 90 percent of total land area.
2. The acreage for both existing and new units is increased by 15 percent to account for infrastructure and other uses.
3. The density for both existing and new units is assumed to be one-half per acre for high-, medium-, and low-value housing units.

**MO-13. (Primary Growth Area)**

1. Developable land is assumed to be 85 percent of total land area.
2. The acreage for both existing and new units is increased by 10 percent to account for infrastructure and other uses.
3. The density for both existing and new units is assumed to be one and one-half per acre for high, one-half per acre for medium-, and three-quarters per acre for low-value housing units.
4. This area consists of Carthage, Mineral Springs, and the McNeils Townships, including the incorporated areas of Mineral Springs and McNeil.

**APPENDIX B**

**SUPPORTING TABLES AND DOCUMENTATION  
FOR CHAPTER 4**

## **SUPPORTING TABLES AND DOCUMENTATION FOR CHAPTER 4**

This appendix presents the tables and other documentation that support the analysis presented in Chapter 4 of the main text. The supporting data are presented in Annex 1: Compatible Land Use Standards.



**ANNEX B-1**

**COMPATIBLE LAND USE STANDARDS**

## COMPATIBLE LAND USE STANDARDS

### INTRODUCTION

These compatible land use standards were adapted from the Pope Air Force Base (AFB) AICUZ study and the Fort Bragg ICUZ study to reflect the conditions in the four-county study area. They apply to all areas (including residential areas) affected by noise, accident potential, height restrictions, and/or low level aircraft overflights. The recommendations from the *Joint Compatible Land Use Policy Study* (JCLUS) report are incorporated into the land use scenarios contained in this report.

Table B-1 outlines the policy standards recommended to local governments and to the military installations.

TABLE B-1

#### RESIDENTIAL RECOMMENDATIONS FOR FIVE NOISE AND ACCIDENT POTENTIAL ZONES

Residential land use category	NAPZ-1	NAPZ-2 75+ LDN 70+ artillery <sup>a</sup>	NAPZ-3 70 - 75 LDN	NAPZ-4 65 - 70 LDN 62 - 70 artillery	NAPZ-5 60 - 65 LDN
Other than mobile homes	N <sup>b</sup>	N <sup>c</sup>	N <sup>d</sup>	N <sup>d</sup>	N <sup>d</sup>
Mobile homes	N	N	N	N	N

*Source: Joint Compatible Land Use Policy: Recommendations to Military Jurisdictions and Local Governments in the Fort Bragg Region, Center for Urban and Regional Studies, University of North Carolina at Chapel Hill, N.C., January 1991.*

**Note:** NAPZ = noise and accident potential zone.

<sup>a</sup> Artillery noise is measured on a C-weighted decibel scale compared with an A-weighted scale for aircraft noise. Because of this, LDN 62 - 70 for artillery noise is approximately equal to LDN 65 - 70 for aircraft noise, and artillery noise of LDN 70 and above is equivalent to LDN 75+ for aircraft.

<sup>b</sup> Because of accident-hazard potential, residential use in this zone should not be allowed. If allowed, it should be limited to the minimum necessary area and not exceed one dwelling per five acres.

<sup>c</sup> Because of accident-hazard potential, residential use in this zone should not be allowed. If allowed, it should be limited to the minimum necessary area and not exceed one dwelling per acre.

<sup>d</sup> Residential development is discouraged.

## **NOISE EXPOSURE AND ACCIDENT POTENTIAL POLICY**

*Suitable and unsuitable* uses are designated for each of six land zones having decreasing noise and accident potential.

The first three land zones are affected primarily by aircraft noise and accident potential in the vicinity of an airfield: Pope AFB, Simmons Army Airfield, and Camp Mackall. They are also affected by noise levels above 75 LDN. The remaining three land zones are affected by noise alone (no accident potential), emanating from either aircraft or artillery. All six land zones are described below, in order of decreasing noise and accident potential levels.

### **Clear Zone**

This zone is defined as the land area immediately off the end of runways at Pope AFB, Simmons Army Airfield, and Camp Mackall. It is typically 2,000 to 3,000 feet wide (1,000 feet to 1,550 feet on either side of the runway centerline) and extends 3,000 feet from the end of the runway. The DoD's policy is that the military must own or acquire (usually via an easement) the land in the clear zones; DoD prohibits incompatible development.

The next two zones, NAPZ-1 and NAPZ-2, are not acquired by the military. However, land use controls by local governments are needed to restrict development due to aircraft accident potential.

### **Noise and Accident Potential Zone 1 (NAPZ-1)**

The NAPZ-1 area is a rectangle 3,000 feet wide that extends 5,000 feet from the end of the clear zone along the runway centerline. This is the most restrictive zone designation that applies off-post. The DoD's policy is to discourage all concentrations of people including residential development, especially residential developments of a density greater than one dwelling unit per five acres.

### **Noise and Accident Potential Zone 2 (NAPZ-2)**

The NAPZ-2 area is a rectangle, 3,000 feet wide, that extends 7,000 feet along the runway axis starting from the end of NAPZ-1. It also consists of areas enclosed by the 75 LDN noise contour. The policy in this area is similar to NAPZ-1's except that there are some allowable nonresidential land uses, such as office buildings, general merchandise trade, and manufacturing industries. Residential use is considered

unsuitable, but if allowed, should be a density of not more than one dwelling unit per acre.

### **Noise and Accident Potential Zone 3 (NAPZ-3)**

The NAPZ-3 area includes land exposed to noise levels of 70 to 75 LDN. It is not considered an accident potential zone. Residential use is still discouraged.

### **Noise and Accident Potential Zone 4 (NAPZ-4)**

The NAPZ-4 area includes land exposed to noise levels between 65 and 70 LDN. It is not in an accident potential zone. Mobile homes are discouraged, but other residential uses are considered suitable if sound attenuation is incorporated.

### **Noise and Accident Potential Zone 5 (NAPZ-5)**

The NAPZ-5 area includes land exposed to noise levels between 60 and 65 LDN. It is not considered an accident potential zone. Mobile homes are discouraged.

## **HEIGHT RESTRICTIONS**

Height restrictions apply to areas centered on one of the three airfields: Pope AFB, Simmons Army Airfield, and Camp Mackall. The navigable airspace near an airfield can be jeopardized by obstructions that limit visibility or hinder navigation. Consistent with Federal Aviation Regulations, Part 77, "Objects Affecting Navigable Airspace," the following recommendation defines a series of three-dimensional imaginary surfaces surrounding an airfield that define the upper height limits of natural or human-built structures.

### **Height Obstruction Zones**

No human-built structure or natural feature (such as a tree) should penetrate the planar surfaces described in the text below.

### **Zone A, Primary Surface**

The primary surface is the runway and the areas adjacent to the runway. The length of the primary surface is the same as the length of the runway (Pope AFB's runway is 7,500 feet long). The width of the primary surface is 2,000 feet, divided equally along an imaginary centerline running down the middle of the runway. The

elevations of the primary surface at the installations are Pope AFB (196 feet), Simmons Army Airfield (230 feet), and Camp Mackall (375 feet).

#### **Zone B, Clear Zone Surface**

The clear zone is a 2,000 by 3,000 foot area immediately off the end of the runway.

#### **Zone C, or Approach-Departure Clearance Surface (Glide Angle) and Zone D, or Approach-Departure Clearance Surface (Horizontal)**

Horizontal approach-departure clearance surfaces are a combination of an inclined and horizontal plane that extends symmetrically on either side of the runway's centerline. The slope and dimension of these planes vary with the type of runway.

#### **SUMMARY OF LAND USE RECOMMENDATIONS**

The actions to take regarding new residential development that were recommended in the JCLUS report vary according to the noise and accident policy zones. The actions are outlined in Table B-2. Generally, they suggest compatible use zoning or rezoning to prohibit unsuitable land uses in the future. Mobile homes should be prohibited in all five zones.

**TABLE B-2**

**RESIDENTIAL LAND USE BY NOISE AND ACCIDENT POTENTIAL ZONES, HEIGHT  
RESTRICTIONS, AND LOW LEVEL OVERFLIGHT AREAS**

<b>Affected area</b>	<b>Recommended residential land use</b>
Clear zone	No residential development
NAPZ-1 NAPZ-2 NAPZ-3 NAPZ-4 and NAPZ-5	All residential uses discouraged One unit per acre (only if under 75 LDN) All types except mobile homes All types except mobile homes
Height-restricted areas	Not applicable to residential development
Low level overflight areas	One unit per five acres

**APPENDIX C**

**SUPPORTING TABLES AND DOCUMENTATION  
FOR CHAPTER 5**

## **SUPPORTING TABLES AND DOCUMENTATION FOR CHAPTER 5**

This appendix presents the tables and other documentation that support Chapter 5 of the main text. The supporting data are presented in Annex 1: Federal Aviation Administration (FAA) Land Use Compatibility Standards and Annex 2: Cost Estimates of Restrictions on Military Operations.



**ANNEX C-1**

**FEDERAL AVIATION ADMINISTRATION LAND USE  
COMPATIBILITY STANDARDS**

# FEDERAL AVIATION ADMINISTRATION LAND USE COMPATIBILITY STANDARDS

TABLE C-1

## FEDERAL AVIATION ADMINISTRATION LAND USE COMPATIBILITY NOISE STANDARDS

Land use	Yearly average day-night average sound exposure (LDN) in A-weighted decibels					
	Below 65	65 – 70	70 – 75	75 – 80	80 – 85	Over 85
Residential						
Residential	Y	Na	Na	N	N	N
Mobile homes	Y	N	N	N	N	N
Transient lodging	Y	Na	Na	Na	N	N
Public use						
Schools	Y	Na	Na	N	N	N
Hospitals/nursing homes	Y	25	30	N	N	N
Churches, concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Yb	Yc	Yd	Yd
Parking	Y	Y	Yb	Yc	Yd	N

**Source:** Federal Aviation Administration (FAA) Regulations, Part 150.

**Notes:** Y = land use and related structures are compatible with restrictions; N = land use and related structures are not compatible and should be prohibited; 25, 30 = noise level reductions (NLRs) of 25 or 30 decibels (dB) must be incorporated into the design and construction of the structure.

<sup>a</sup> Where the community determines that use must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 dB should be incorporated into building codes. Normal residential construction can be expected to provide an NLR of 20 dB; thus, an NLR of 25 is 5 dB NLRs over standard construction. One can normally assume that there will be mechanical ventilation and closed windows all year long.

<sup>b</sup> A 25 dB NLR must be incorporated into noise-sensitive portions of buildings, such as office space or other public spaces.

<sup>c</sup> A 30 dB NLR must be incorporated into noise-sensitive portions of buildings, such as office space or other public spaces.

<sup>d</sup> A 35 dB NLR must be incorporated into noise-sensitive portions of buildings, such as office space or other public spaces.

**ANNEX C-2**

**COST ESTIMATES OF RESTRICTIONS  
ON MILITARY OPERATIONS**

## COST ESTIMATES OF RESTRICTONS ON MILITARY OPERATIONS

**TABLE C-2**  
**ESTIMATING THE COSTS OF RESTRICTED MILITARY OPERATIONS**  
(\$ millions)

Compatible land use scenario	Military operations restrictions							2010 total annual cost
	A	B	C	D	E	F	G	
Scenario 1 Baseline restriction condition	\$3.00	\$4.01	0	—	\$0.96	0	—	\$7.97
Scenario 2 Limited restrictions	3.00	4.01	—	0	0.96	0	—	7.97
Scenario 3 Moderate restrictions	3.00	4.01	—	—	—	—	—	7.01
Scenario 4 Major restrictions	—	—	—	—	—	—	\$2.67	2.67
Scenario 5 Comprehensive restrictions	—	—	—	—	—	—	—	—

*Note:* Estimated annual costs to the military for the year 2010 in 1992 dollars associated with land use restrictions. Restrictions: A = limits on low-level night flight operations; B = zones A, B, and C overflight areas reduced by two-thirds; C = air operations from Simmons and Pope would be reduced by 25 percent; D = air operations from Simmons and Pope would be reduced by 15 percent; E = limits on night artillery operations; F = limits on night airfield operations; and G = low level overflight operations limited to west corridor.

## **RESTRICTION A: Limits placed on low-level night flight operations**

### **Key assumptions**

1. Sixty percent of all drops are at night.
2. Night drops will be cut by 50 percent.
3. Fifteen percent of equipment drops will also be affected.
4. Fort Pickett is the alternative site for night drops.

### **Cost estimate of changing operations to meet this restriction**

520	Paratroop sorties affected
263	Equipment sorties affected
\$1,280	Hourly cost ( <i>aircraft operations cost</i> )
3	Additional hours per sortie
<u>\$3,840</u>	Additional cost per sortie ( <i>hourly cost multiplied by additional hours per sortie</i> )
\$3,006,720	Additional operation costs from this restriction ( <i>additional cost per sortie multiplied by total affected sorties</i> )

**RESTRICTION B: Zones A, B, and C low-level overflight zones will be reduced by two-thirds (to the east and west).**

### **Key assumption**

Assume that 20 percent of all sorties will be moved to Fort Pickett.

### **Cost estimate of changing operations to meet this restriction**

520	Paratroop sorties affected
525	Equipment sorties affected
\$1,280	Hourly cost ( <i>aircraft operations cost</i> )
3	Additional hours per sortie
<u>\$3,840</u>	Additional cost per sortie ( <i>hourly cost multiplied by additional hours per sortie</i> )
\$4,012,800	Additional operation costs from this restriction ( <i>additional cost per sortie multiplied by total affected sorties</i> )

**RESTRICTION C:** Air operations from Simmons Army Airfield and Pope Air Force Base (AFB) will be reduced by 25 percent.

**Key assumptions**

1. Assume that the aerial gunnery restriction covers this restriction.
2. Assume that a tactical aircraft could fit within reduced time frames due to the reduction in nighttime paratroop sorties.

*(No costs are associated with this restriction.)*

**RESTRICTION D:** Air operations from Simmons Army Airfield and Pope AFB will be reduced by 15 percent.

**Key assumptions**

1. Assume that the aerial gunnery restriction covers this restriction.
2. Assume tactical aircraft could fit within reduced time frames due to the reduction in nighttime paratroop sorties.

*(No costs are associated with this restriction.)*

**RESTRICTION E:** Limits will be placed on night artillery operations.

**Key assumption**

Alternative sites for air gunnery and armor training are Fort Stewart and Fort Pickett.

**Cost estimate of changing operations to meet this restriction**

Aviation:	\$42,362	Fort Stewart, round-trip transportation costs
	25,336	Fort Pickett, round-trip transportation costs
Armor:	451,300	3 × 73rd Armor, round-trip transportation costs
	<u>441,548</u>	2 × 252nd Armor, round-trip transportation costs
	\$960,546	Total annual costs from this restriction

**RESTRICTION F:** Limits placed on night airfield operations.

**Key assumptions**

1. Assume that the limitation on aerial gunnery takes care of reduced operation impact for Army.

2. Assume that tactical aircraft could operate within the reduced time frames since nighttime paratroop sorties are reduced.

*(No costs are associated with this restriction.)*

**RESTRICTION G:** Low-level overflight operations will be limited to the west corridor of the overflight zone.

**Key assumptions**

1. Assume 20 percent of all sorties will be moved.

2. Assume Fort Pickett is the alternative site for these drops.

**Cost estimate of changing operations to meet this restriction**

346	Paratroop sorties affected
350	Equipment sorties affected
\$1,280	Hourly cost ( <i>aircraft operations cost</i> )
3	Additional hours per sortie
<u>\$3,840</u>	Additional cost per sortie ( <i>hourly cost multiplied by additional hours per sortie</i> )
\$2,672,640	Additional paratroop operation costs from this restriction ( <i>additional cost per sortie multiplied by total affected sorties</i> )

**APPENDIX D**

**SUPPORTING TABLES AND DOCUMENTATION  
FOR CHAPTER 6**



## **SUPPORTING TABLES AND DOCUMENTATION FOR CHAPTER 6**

This appendix presents the tables and other documentation that support the analysis presented in Chapter 6 of the main text. The supporting data are presented in a series of annexes as follows:

**Annex 1: Estimated Per Capita Sales Tax Revenue by House Value**

**Annex 2: Fiscal Impact Analysis Model Outputs and Notes for Cumberland County**

**Annex 3: Fiscal Impact Analysis Model Outputs and Notes for Harnett County**

**Annex 4: Fiscal Impact Analysis Model Outputs and Notes for Hoke County**

**Annex 5: Fiscal Impact Analysis Model Outputs and Notes for Moore County**

**ANNEX D-1**

**ESTIMATED PER CAPITA SALES TAX REVENUE  
BY HOUSE VALUE**

# ESTIMATED PER CAPITA SALES TAX REVENUE BY HOUSE VALUE

TABLE D-1

## ESTIMATED PER CAPITA SALES TAX REVENUE BY HOUSE VALUE

Category	House value <sup>a</sup>	Per capita income <sup>b</sup>	Income as % of house value	Per capita tax (1989 – 1990)	Percentage of per capita income <sup>c</sup>
Cumberland County					
Low	\$24,550 <sup>a</sup>	\$5,254	.214	\$40	0.77
Middle	63,500	13,576	.214	95	0.70
High	83,000	17,706	.214	120	0.63
Harnett County					
Low	\$17,600 <sup>a</sup>	\$3,854	.219	\$32	0.84
Middle	50,800	11,120	.219	84	0.76
High	71,700	15,702	.219	107	0.68
Hoke County					
Low	\$15,050 <sup>a</sup>	\$3,055	.203	\$19	0.63
Middle	44,800	9,091	.203	\$52 <sup>d</sup>	0.57
High	65,900	13,378	.203	\$68	0.51
Moore County					
Low	\$23,200 <sup>a</sup>	\$5,011	.216	\$32	0.64
Middle	80,300	17,306	.216	101	0.58
High	134,200	28,987	.216	151	0.52

<sup>a</sup> Fifty percent of the owner-occupied, lower quartile, from 1990 Census data.

<sup>b</sup> From U.S. Department of Commerce, Bureau of Economic Analysis, for the mean in 1989; others derived from applying income/house value ratio.

<sup>c</sup> Low and high percentage adjusted from middle income to reflect consumption patterns.

<sup>d</sup> Based on 1990 population of 22,856 persons.

**ANNEX D-2**

**FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES  
FOR CUMBERLAND COUNTY**

**CUMBERLAND COUNTY**

<b>SCENARIO INPUT TABLE</b>	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>	<b>Scenario 5</b>
<b>Analysis Period (year)</b>	2010	2010	2010	2010	2010
<b>DEMAND ASSUMPTION (1)</b> (High, Most Likely, or Low)	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%
<b>EXISTING: (2)</b>					
Total Net Acres	325,262	325,262	325,262	325,262	325,262
Existing Units	89,695	89,695	89,695	89,695	89,695
Acres in use	48,490	48,490	48,490	48,490	48,490
<b>PROJECTED: (3)</b>					
Units Required to meet Demand	28,414	28,414	28,414	28,414	28,414
Above Average \$ Value	4,104	4,104	4,104	4,104	4,104
Average \$ Value	20,190	20,190	20,190	20,190	20,190
Below Average \$ Value	4,120	4,120	4,120	4,120	4,120
Acres Required to meet Demand	14,145	14,145	14,145	14,145	14,145
<b>AFFECTED: (4)</b>					
Acres Affected by Scenario	640	954	5,190	16,889	26,944
New Units Affected by Scenario	61	93	1,057	3,167	4,926
Above Average \$ Value	1	2	132	428	647
Average \$ Value	46	70	791	2,355	3,652
Below Average \$ Value	14	21	134	384	627
Units Displaced from County by Scenario (5)	0	0	0	0	0
Above Average \$ Value	0	0	0	0	0
Average \$ Value	0	0	0	0	0
Below Average \$ Value	0	0	0	0	0
<b>OTHER INPUTS:</b>					
Value per Unit (1990 \$) (6)					
Above Average \$ Value	\$83,000	\$83,000	\$83,000	\$83,000	\$83,000
Average \$ Value	\$63,500	\$63,500	\$63,500	\$63,500	\$63,500
Below Average \$ Value	\$24,550	\$24,550	\$24,550	\$24,550	\$24,550
Analysis Period (Years)	19	19	19	19	19
Average Household Size Per Unit (2010) (7)	2.60	2.60	2.60	2.60	2.60
Real Property Tax Rate (per \$100) (1990)	\$0.725	\$0.725	\$0.725	\$0.725	\$0.725
Commercial Property Factor (8)					
Above Average \$ Value	115%	115%	115%	115%	115%
Average \$ Value	116%	116%	116%	116%	116%
Below Average \$ Value	117%	117%	117%	117%	117%
1990 Population (Actual)	274,566	274,566	274,566	274,566	274,566
New Population (1990-2010) (9)	53,486	53,486	53,486	53,486	53,486
New Households (1990-2010) (10)	26,555	26,555	26,555	26,555	26,555
<b>Summary:</b>	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>	<b>Scenario 5</b>
Acres Available	325,262	325,262	325,262	325,262	325,262
Acres in Use	48,490	48,490	48,490	48,490	48,490
Acres of Demand	14,145	14,145	14,145	14,145	14,145
Acres Affected	640	954	5,190	16,889	26,944
Acres left for Development	261,887	261,673	257,437	245,738	235,683
Units of Demand	28,414	28,414	28,414	28,414	28,414
Value of Demand Units	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000
New Units Affected	61	93	1,057	3,167	4,926
Percent of Demand Affected	0.2%	0.3%	3.7%	11.1%	17.3%
Value of Affected Units	\$3,347,700	\$5,126,550	\$64,474,200	\$194,493,700	\$300,995,850
New Units Displaced	0	0	0	0	0
Value of Displaced Units	\$0	\$0	\$0	\$0	\$0
New Households Displaced	0	0	0	0	0
Displaced Population	0	0	0	0	0
Annual Revenues	\$34,887,308	\$34,887,308	\$34,887,308	\$34,887,308	\$34,887,308
Annual Expenditures	\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510
Cash Flow	\$843,798	\$843,798	\$843,798	\$843,798	\$843,798
Change (from baseline case) (11)	\$0	\$0	\$0	\$0	\$0

CLATSOP COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

	Fiscal Year				Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	1988	1989	1990	1991	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
<b>ECONOMIC IMPACTS:</b>														
Population (8)	263,883	269,075	274,586		53,488	53,488	53,488	53,488	53,488	53,488	53,488	53,488	53,488	53,488
School Children (Estimated at 16%)	42,173	43,052	43,931		8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558
Households (10)					26,855	26,855	26,855	26,855	26,855	26,855	26,855	26,855	26,855	26,855
<b>DEVELOPMENT IMPACTS</b>														
Direct Residential Development														
Total Net Acres					326,262	326,262	326,262	326,262	326,262	326,262	326,262	326,262	326,262	326,262
Units Required to meet Demand (3)					28,414	28,414	28,414	28,414	28,414	28,414	28,414	28,414	28,414	28,414
Acres Required to meet Demand					14,145	14,145	14,145	14,145	14,145	14,145	14,145	14,145	14,145	14,145
Acres Affected by Scenario (4)					640	954	954	954	954	954	954	954	954	954
Units Affected by Scenario (4)					81	93	93	93	93	93	93	93	93	93
Units Displaced by Adopting Zoning (5)					0	0	0	0	0	0	0	0	0	0
Total Value of New Development (Residential Only) (11)					\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000	\$1,723,843,000
Total Value of New Development (Residential and Commercial) (12)					\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020	\$1,997,263,020

CUMBERLAND COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

NEW OPERATING REVENUES	Fiscal Year				Scenario 1					Scenario 2					Scenario 3					Scenario 4					Scenario 5							
	1988		1989		1990		Actual	1988		1989		1990		Actual	1988		1989		1990		Actual	1988		1989		1990		Actual				
DEMOGRAPHIC DATA																																
					1990 Population																											
					New Population (1990-2010) (8)			274,866					274,866									274,866										274,866
					New Households (1990-2010) (10)			63,488					63,488									63,488										63,488
					New Housing Units (1990-2010) (9)			26,666					26,666									26,666										26,666
					Total Population (2010)			28,414					28,414									28,414										28,414
					Population Growth (20-year)			19.48%					19.48%									19.48%										19.48%
REVENUES:																																
Property Tax:																																
Real Property (13)																																
Other Property (14)																																
Sales Tax (15)																																
					Per Household \$																											
					Per Household \$ (Above Average)			3312					3312									3312										3312
					Per Household \$ (Average)			3247					3247									3247										3247
					Per Household \$ (Below Average)			3104					3104									3104										3104
								66,696,858					66,696,858									66,696,858										66,696,858
Other Tax (16)																																
					Per Household \$ (Total)			674					674									674										674
Sales & Service (17)																																
					Per Household \$ (Total)			649					649									649										649
Intergovernmental (18)																																
					Per Household \$ (Total)			3264					3264									3264										3264
Miscellaneous (19)																																
					Per Household \$ (Total)			684					684									684										684
TOTAL REVENUES: (20)																																
Revenues: (Excluding Real Property Taxes)																																
Real Property Taxes:																																
Total:																																

**CUMBERLAND COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES**

**NEW OPERATING EXPENDITURES**

Fiscal Year	1989		1990		PROJECTED GROWTH: (28)				
	Actual	Actual	Actual	Actual	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<b>EXPENDITURES:</b>									
Local Funds for Education (21)									
Per Household \$ (Total)	\$262	\$311	\$339		\$332	\$332	\$332	\$332	\$332
					\$9,816,260	\$9,816,260	\$9,816,260	\$9,816,260	\$9,816,260
Debt Service (22)									
Per Household \$ (Total)	\$64	\$68	\$48		\$59	\$59	\$59	\$59	\$59
					\$1,566,745	\$1,566,745	\$1,566,745	\$1,566,745	\$1,566,745
Human Services (23)									
Per Household \$ (Total)	\$294	\$332	\$357		\$352	\$352	\$352	\$352	\$352
Per Household \$ (Military)	\$171	\$180	\$188		\$188	\$188	\$188	\$188	\$188
Per Household \$ (Civilian)	\$418	\$439	\$460		\$460	\$460	\$460	\$460	\$460
					\$12,216,300	\$12,216,300	\$12,216,300	\$12,216,300	\$12,216,300
General Government (24)									
Per Household \$ (Total)	\$93	\$88	\$84		\$92	\$92	\$92	\$92	\$92
					\$2,443,060	\$2,443,060	\$2,443,060	\$2,443,060	\$2,443,060
Public Safety (25)									
Per Household \$ (Total)	\$148	\$171	\$183		\$186	\$186	\$186	\$186	\$186
					\$4,839,230	\$4,839,230	\$4,839,230	\$4,839,230	\$4,839,230
Other (26)									
Per Household \$ (Total)	\$153	\$160	\$128		\$153	\$153	\$153	\$153	\$153
					\$4,062,915	\$4,062,915	\$4,062,915	\$4,062,915	\$4,062,915
<b>TOTAL EXPENDITURES:</b>									
					\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510	\$34,043,510
<b>Cash Flow:</b>									
					\$843,788	\$843,788	\$843,788	\$843,788	\$843,788



**PROJECTED GROWTH: (25)**

D-2-7

## **FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES FOR CUMBERLAND COUNTY**

*(These model notes are numbered to correspond with note numbers on the fiscal impact analysis (FIA) model outputs for this county.)*

**1. Demand Assumption** – The demand assumption defines the projected level of population and housing growth for all growth scenarios. The most likely level of growth is defined as the level of growth projected from the North Carolina State estimates. The high- and low-growth scenarios assume a growth level 15 percent above and below the state estimate.

**2. Existing Housing Supply** – Values in this category define current land use in the county. Total developable land is estimated from U.S. Geological Survey maps and county data. The number excludes the infrastructure associated with existing housing, including roads and streets, public lands, schools and other public facilities, commercial uses, and areas of land not suitable for construction because of topographical limitations. Existing housing units are estimated from 1990 Census data. Existing acreage in use is estimated from current housing densities and includes land for the infrastructure.

**3. Projected Housing Supply** – Values in this category define future housing demand based on projected population growth and include new units required for housing replacement. The market value of new units is defined for above-average, average, and below-average price based on 1990 Census data.

**4. Affected Housing Supply** – Values in this category identify the number of housing units and the total net acreage that falls under the noise zones, low-level overflight zones, and height-restricted areas defined for each scenario of land use restrictions. This does not include existing units.

**5. Units Displaced from County** – Units displaced are the number of affected housing units, by value, that are estimated to be lost from the county if land use restrictions are imposed. It is assumed that dislocations would take place: (1) where land use restrictions on density would lower the amount of developable land to the point where the county could not absorb the level of projected growth or

(2) where a specific parcel of land is considered sufficiently unique (e.g., a lake or resort area) that if land use was restricted, at least some of the demand for the area would be relocated outside the county.

**6. Value per Housing Unit** – The values per housing unit in the above-average, average, and below-average price ranges taken from 1990 Census data.

**7. Average Household Size per Unit** – The average household size per unit is projected based on 1990 Census data and projections of household size for the year 2010. For Cumberland County, projections of household size were completed at the County Planning District level, based on 1990 Census data for each census tract.

**8. Commercial Property Factor** – This value is used to estimate the commercial property value associated with new housing units. For example, a new house of above-average value is assumed to have an additional 15 percent of commercial property value associated with it. Therefore, the addition of each unit that sells for, say, \$100,000 would generate \$115,000 in combined residential and commercial property value.

**9. New Population (1990 through 2010)** – The total new population for the years 1990 through 2010 is based on estimates from the State of North Carolina.

**10. New Households (1990 through 2010)** – The number of new households for this period is based on state population projections and is adjusted for average household size by census tract.

**11. Change in Operating Cash Flow (from the baseline case)** – This value indicates the net fiscal change (revenues minus expenditures) to the county operating budget associated with each land-use scenario compared with the cash flow in the baseline condition where no land-use restrictions are applied.

**12. Total Value of New Development (residential and commercial)** – The total value of new development includes the value of new housing units projected for the county, by market value, and it is adjusted to include the commercial property value associated with residential growth.

**13. Real Property Tax** – Revenues in this category are projected based on the value of real property development for the years 1990 through 2010 multiplied by the

county's 1990 real property tax rate. Real property is assumed to be assessed at 92 percent of market value.

**14. Sales Tax** – Revenues in this category are projected based on FY90 historical rates for nonmilitary households, adjusted to 1990 dollars. This value is estimated based on the expected sales tax generated from above-average, average, and below-average price housing units. For Cumberland County, the overall per household average is adjusted upward to account for military households, which do not generate sales taxes at the same rate as nonmilitary households due to tax-exempt on-base purchases. (Typically, about one-third of all retail purchases by military households are made on the base). It is assumed that all county growth will be in nonmilitary households.

**16., 17., 18., 19.** – Revenues in these categories are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**20. Total Revenues** – Total revenues are the projected revenues generated from new real property and new households for the years 1990 through 2010, for each scenario of land use restrictions.

**21.** – Expenditures in this category are projected based on FY89 and FY90 per household historical rates adjusted to 1990 dollars. Local funds for education do not include state funds.

**22., 24., 26.** – Expenditures in these categories are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**23. Human Services** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars. For Cumberland County, the overall historical per household rates are adjusted upward to account for the differences in human service levels for military and nonmilitary families. It is assumed that military households consume human services at about 20 percent of the nonmilitary household rate. This is due to demographic and economic differences in military households and the availability of on-base social services. It is assumed that all county growth will be in nonmilitary households.

**27. Revenue and Expenditure Forecasts** – The forecasted fiscal flows from the FIA are based on projected county growth for the years 1990 through 2010, adjusted to 1990 dollars, as affected by each land use scenario.

**28. Projected Growth** – Projected growth is based on North Carolina State estimates for the county for the years 1990 through 2010. These growth estimates are provided for high-, low-, and most likely growth scenarios as noted in the “demand assumption” line on the first page of the FIA model (Scenario Input Table).

**ANNEX D-3**

**FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES  
FOR HARNETT COUNTY**

# HARNETT COUNTY

SCENARIO INPUT TABLE					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Analysis Period (year)	2010	2010	2010	2010	2010
DEMAND ASSUMPTION (1)	Most Likely	Most Likely	Most Likely	Most Likely	Most Likely
(High, Most Likely, or Low)	100%	100%	100%	100%	100%
EXISTING: (2)					
Total Net Acres	323,685	323,685	323,685	323,685	323,685
Existing Units	27,896	27,896	27,896	27,896	27,896
Acres in use	27,876	27,876	27,876	27,876	27,876
PROJECTED: (3)					
Units Required to meet Demand	9,153	9,153	9,153	9,153	9,153
Above Average \$ Value	2,320	2,320	2,320	2,320	2,320
Average \$ Value	4,562	4,562	4,562	4,562	4,562
Below Average \$ Value	2,271	2,271	2,271	2,271	2,271
Acres Required to meet Demand	11,905	11,905	11,905	11,905	11,905
AFFECTED: (4)					
Acres Affected by Scenario	0	0	0	32,051	32,143
New Units Affected by Scenario	0	0	0	2,452	2,498
Above Average \$ Value	0	0	0	461	466
Average \$ Value	0	0	0	1,147	1,172
Below Average \$ Value	0	0	0	854	871
Units Displaced from County by Scenario (5)	0	0	0	0	0
Above Average \$ Value	0	0	0	0	0
Average \$ Value	0	0	0	0	0
Below Average \$ Value	0	0	0	0	0
OTHER INPUTS:					
Value per Unit (1990 \$) (6)					
Above Average \$ Value	\$71,700	\$71,700	\$71,700	\$71,700	\$71,700
Average \$ Value	\$50,800	\$50,800	\$50,800	\$50,800	\$50,800
Below Average \$ Value	\$17,600	\$17,600	\$17,600	\$17,600	\$17,600
Analysis Period (Years)	19	19	19	19	19
Average Household Size Per Unit (2010) (7)	2.42	2.42	2.42	2.42	2.42
Real Property Tax Rate (Per \$100) (1990)	\$0.730	\$0.730	\$0.730	\$0.730	\$0.730
Commercial Property Factor (8)					
Above Average \$ Value	115%	115%	115%	115%	115%
Average \$ Value	116%	116%	116%	116%	116%
Below Average \$ Value	117%	117%	117%	117%	117%
1990 Population (Actual)	67,822	67,822	67,822	67,822	67,822
New Population (1990-2010) (9)	16,756	16,756	16,756	16,756	16,756
New Households (1990-2010) (10)	8,521	8,521	8,521	8,521	8,521
Summary:	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Acres Available	323,685	323,685	323,685	323,685	323,685
Acres in Use	27,876	27,876	27,876	27,876	27,876
Acres of Demand	11,905	11,905	11,905	11,905	11,905
Acres Affected	0	0	0	32,051	32,143
Acres left for Development	283,904	283,904	283,904	251,853	251,761
Units of Demand	9,153	9,153	9,153	9,153	9,153
Value of Demand Units	\$438,063,200	\$438,063,200	\$438,063,200	\$438,063,200	\$438,063,200
New Units Affected	0	0	0	2,452	2,498
Percent of Demand Affected	0.0%	0.0%	0.0%	26.8%	27.3%
Value of Affected Units	\$0	\$0	\$0	\$105,634,700	\$107,490,700
New Units Displaced	0	0	0	0	0
Value of Displaced Units	\$0	\$0	\$0	\$0	\$0
New Households Displaced	0	0	0	0	0
Displaced Population	0	0	0	0	0
Annual Revenues	\$9,596,729	\$9,596,729	\$9,596,729	\$9,596,729	\$9,596,729
Annual Expenditures	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361
Cash Flow	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368
Change (from baseline case) (11)	\$0	\$0	\$0	\$0	\$0

# HARRIETT COUNTY FISCAL IMPACT ANALYSIS OF COMPATIBLE LAND USE ALTERNATIVES

## PROJECTED GROWTH: (28)

	Fiscal Year			Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	1988	1989	1990	2010	2010	2010	2010	2010
<b>ECONOMIC IMPACTS:</b>								
Population (8)	65,109	66,466	67,822	18,756	18,756	18,756	18,756	18,756
School Children (Estimated at 18%)	10,417	10,634	10,852	2,881	2,881	2,881	2,881	2,881
Households (11)				8,521	8,521	8,521	8,521	8,521
<b>DEVELOPMENT IMPACTS</b>								
Direct Residential Development								
Total Net Acres (3)				323,685	323,685	323,685	323,685	323,685
Units Required to meet Demand				9,153	9,153	9,153	9,153	9,153
Acres Required to meet Demand				11,906	11,906	11,906	11,906	11,906
Acres Affected by Scenario (4)				0	0	0	32,061	32,143
Units Affected by Scenario (4)				0	0	0	0	2,498
Units Displaced by Adopting Zoning (5)				0	0	0	0	0
Total Value of New Development (Residential Only) (11)				\$438,063,200	\$438,063,200	\$438,063,200	\$438,063,200	\$438,063,200
Total Value of New Development (Residential and Commercial) (12)				\$506,889,568	\$506,889,568	\$506,889,568	\$506,889,568	\$506,889,568



HARNETT COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

NEW OPERATING REVENUES

DEMOGRAPHIC DATA

1990 Population (9)  
New Population (1990-2010) (10)  
New Households (1990-2010) (8)  
New Housing Units (1990-2010)  
Total Population (2010)  
Population Growth (20-year)

REVENUES:

Property Tax

Real Property (13)

Other Property (14)

Sales Tax (15)

Per Household \$  
Per Household \$ (Above Average)  
Per Household \$ (Average)  
Per Household \$ (Below Average)

Other Tax (16)

Per Household \$

Sales & Service (17)

Per Household \$

Intergovernmental (18)

Per Household \$

Miscellaneous (19)

Per Household \$

TOTAL REVENUES: (20)

Revenues: (Excluding Real Property Taxes)  
Real Property Taxes:  
Total:

PROJECTED GROWTH: (28)

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2010	2010	2010	2010	2010
67,822	67,822	67,822	67,822	67,822
16,756	16,756	16,756	16,756	16,756
8,621	8,621	8,621	8,621	8,621
9,163	9,163	9,163	9,163	9,163
84,578	84,578	84,578	84,578	84,578
24.71%	24.71%	24.71%	24.71%	24.71%
\$3,896,408	\$3,896,408	\$3,896,408	\$3,896,408	\$3,896,408
\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264
\$586,145	\$586,145	\$586,145	\$586,145	\$586,145
\$259	\$259	\$259	\$259	\$259
\$203	\$203	\$203	\$203	\$203
\$77	\$77	\$77	\$77	\$77
\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970
\$52	\$52	\$52	\$52	\$52
\$443,082	\$443,082	\$443,082	\$443,082	\$443,082
\$81	\$81	\$81	\$81	\$81
\$775,411	\$775,411	\$775,411	\$775,411	\$775,411
\$216	\$216	\$216	\$216	\$216
\$1,840,636	\$1,840,636	\$1,840,636	\$1,840,636	\$1,840,636
\$110	\$110	\$110	\$110	\$110
\$937,310	\$937,310	\$937,310	\$937,310	\$937,310
\$6,266,484	\$6,266,484	\$6,266,484	\$6,266,484	\$6,266,484
\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264
\$6,596,728	\$6,596,728	\$6,596,728	\$6,596,728	\$6,596,728

PROJECTED GROWTH (28)

HARNETT COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

NEW OPERATING EXPENDITURES

EXPENDITURES:

Local Funds for Education (21)

Per Household \$

Debt Service (22)

Per Household \$

Human Services (23)

Per Household \$

General Government (24)

Per Household \$

Public Safety (25)

Per Household \$

Other (26)

Per Household \$

TOTAL EXPENDITURES:

Fiscal Year	1988		1990		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	Actual	Actual	Actual	Actual	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
	\$132	\$201	\$200		\$205	\$205	\$205	\$205	\$205	\$205	\$205	\$205	\$205	\$205
					\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806
	\$30	\$14	\$14		\$14	\$14	\$14	\$14	\$14	\$14	\$14	\$14	\$14	\$14
					\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284
	\$188	\$213	\$245		\$234	\$234	\$234	\$234	\$234	\$234	\$234	\$234	\$234	\$234
					\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814	\$1,993,814
	\$85	\$86	\$117		\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117
					\$996,967	\$996,967	\$996,967	\$996,967	\$996,967	\$996,967	\$996,967	\$996,967	\$996,967	\$996,967
	\$122	\$167	\$180		\$177	\$177	\$177	\$177	\$177	\$177	\$177	\$177	\$177	\$177
					\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217
	\$197	\$271	\$304		\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$284
					\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174	\$2,506,174
Total:					\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361
Cash Flow:					\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368

HARNETT COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

Fiscal Year	1988	1989	1990	Scenario 1				Scenario 2				Scenario 3				Scenario 4				Scenario 5			
	Actual	Actual	Actual	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010	Most Likely	2010
<b>DEMOGRAPHIC DATA</b>																							
Demand Assumption:																							
Population	68,109	68,406	67,822																				
Population Growth (20-year)																							
<b>REVENUES: (27)</b>																							
Property Tax	\$7,476,180	\$9,183,211	\$11,078,824	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409	\$3,886,409
Real Property	\$6,162,890	\$7,666,013	\$9,117,872	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264	\$3,330,264
Other Property	\$1,323,280	\$1,827,198	\$1,960,952	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145	\$556,145
Sales Tax	\$2,951,084	\$6,211,316	\$6,033,376	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970	\$1,703,970
Other Tax	\$943,763	\$1,206,304	\$1,928,142	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082	\$443,082
Sales & Service	\$1,447,315	\$2,083,807	\$2,941,191	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411	\$775,411
Intergovernmental	\$5,137,006	\$4,771,862	\$7,149,610	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538	\$1,840,538
Miscellaneous	\$1,084,878	\$1,330,221	\$4,866,070	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310	\$937,310
Total:	\$19,040,208	\$23,706,681	\$33,196,182	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728	\$9,586,728
<b>EXPENDITURES: (27)</b>																							
Local Funds for Education	\$3,540,264	\$5,509,585	\$5,616,309	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806	\$1,746,806
Debt Service	\$806,313	\$383,118	\$384,704	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284	\$119,284
Human Services	\$5,047,480	\$5,858,220	\$6,883,915	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814	\$1,893,814
General Government	\$1,748,762	\$2,367,467	\$3,284,306	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967	\$896,967
Public Safety	\$3,286,378	\$4,576,482	\$5,049,711	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217	\$1,508,217
Other	\$5,037,098	\$7,440,484	\$9,525,818	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174	\$2,505,174
Total:	\$19,462,268	\$28,123,274	\$28,724,602	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361	\$8,870,361
Operating Cash Flow:	(\$422,060)	(\$2,417,683)	\$3,471,620	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368	\$726,368

## **FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES FOR HARNETT COUNTY**

*(These model notes are numbered to correspond with note numbers on the fiscal impact analysis model outputs for this county.)*

**1. Demand Assumption** – The demand assumption defines the projected level of population and housing growth for all growth scenarios. The most likely level of growth is defined as the level of growth projected from the North Carolina State estimates. The high- and low-growth scenarios assume a growth level 15 percent above and below the state estimate.

**2. Existing Housing Supply** – Values in this category define current land use in the county. Total developable land is estimated from U.S. Geological Survey maps and county data. That number excludes the infrastructure associated with existing housing, including roads and streets, public lands, schools and other public facilities, commercial uses, and areas of land not suitable for construction because of topographical limitations. Existing housing units are estimated from 1990 Census data. Existing acreage in use is estimated from current housing densities and includes land for the infrastructure.

**3. Projected Housing Supply** – Values in this category define future housing demand based on projected population growth and include new units required for housing replacement. The market value of new units is defined for above-average, average, and below-average price based on 1990 Census data.

**4. Affected Housing Supply** – Values in this category identify the number of housing units, by value, and total net acreage that falls under the noise zones, low-level overflight zones, and height-restricted areas defined for each scenario of land use restrictions. This does not include existing units.

**5. Units Displaced from County** – Units displaced are the number of affected housing units, by value, that are estimated to be lost from the county if land use restrictions are imposed. It is assumed that dislocations would take place: (1) where land use restrictions on density would lower the amount of developable land to the point where the county could not absorb the level of projected growth or

(2) where a specific parcel of land is considered sufficiently unique (e.g., a lake or resort area) that if land use was restricted, at least some of the demand for the area would be relocated outside the county.

**6. Value per Housing Unit** – The values per housing unit in the above-average, average, and below-average price ranges are from 1990 Census data.

**7. Average Household Size per Unit** – The average household size per unit is projected based on 1990 Census data and projections of household size for the year 2010.

**8. Commercial Property Factor** – This value is used to estimate the commercial property value associated with new housing units. For example, a new house of above-average value is assumed to have an additional 15 percent of commercial property value associated with it. Therefore, the addition of each unit that sells for, say, \$100,000 would generate \$115,000 in combined residential and commercial property value.

**9. New Population (1990 through 2010)** – The total new population for the years 1990 through 2010 is based on estimates from the State of North Carolina.

**10. New Households (1990 through 2010)** – The number of new households for this period is based on state population projections and is adjusted for average household size by census tract.

**11. Change in Operating Cash Flow (from the baseline case)** – This value indicates the net fiscal change (revenues minus expenditures) to the county operating budget associated with each land-use scenario compared with the cash flow in the baseline condition where no land-use restrictions are applied.

**12. Total Value of New Development (residential and commercial)** – The total value of new development includes the value of new housing units projected for the county, by market value, and it is adjusted to include the commercial property value associated with residential growth.

**13. Real Property Tax** – Revenues in this category are projected based on the value of real property development for the years 1990 through 2010 multiplied by the county's 1990 real property tax rate. Real property is assumed to be assessed at 92 percent of market value.

**14. Sales Tax** – Revenues in this category are projected based on FY90 historical rates for nonmilitary households adjusted to 1990 dollars. This value is estimated based on the expected sales tax generated from above-average, average, and below-average price housing units. It is assumed that all county growth will be in nonmilitary households.

**16., 17.** – Revenues in these categories are projected based on FY89 and FY90 historical per household rates adjusted to 1990 dollars.

**18., 19.** – Revenues in these categories are projected based on FY88, FY89, and FY90 historical per household rates adjusted to 1990 dollars.

**20. Total Revenues** – Total revenues are the projected revenues generated from new real property and new households for the years 1990 through 2010, for each scenario of land use restrictions.

**21. Local Funds for Education** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars. These expenditures do not include state funds.

**22., 25., 26.** – Expenditures in these categories are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**23. Human Services** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars. It is assumed that all county growth will be in nonmilitary households.

**24. General Government** – Expenditures in this category are projected based on FY90 per household historical rates adjusted to 1990 dollars.

**27. Revenue and Expenditure Forecasts** – The forecasted fiscal flows from the FIA are based on projected county growth for the years 1990 through 2010, adjusted to 1990 dollars, as affected by each land use scenario.

**28. Projected Growth** – Projected growth is based on North Carolina State estimates for the county for the years 1990 through 2010. These growth estimates are provided for high-, low-, and most likely growth scenarios as noted in the "demand assumption" line on the first page of the FIA model (Scenario Input Table).

**ANNEX D-4**

**FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES  
FOR HOKE COUNTY**

# HOKE COUNTY

SCENARIO INPUT TABLE					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Analysis Period (year)	2010	2010	2010	2010	2010
DEMAND ASSUMPTION (1) (High, Most Likely, or Low)	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%
EXISTING: (2)					
Total Net Acres	102,607	102,607	102,607	102,607	102,607
Existing Units	7,194	7,194	7,194	7,194	7,194
Acres in use	10,998	10,998	10,998	10,998	10,998
PROJECTED: (3)					
Units Required to meet Demand	2,587	2,587	2,587	2,587	2,587
Above Average \$ Value	532	532	532	532	532
Average \$ Value	1,041	1,041	1,041	1,041	1,041
Below Average \$ Value	1,014	1,014	1,014	1,014	1,014
Acres Required to meet Demand	2,531	2,531	2,531	2,531	2,531
AFFECTED: (4)					
Acres Affected by Scenario	0	0	3,200	4,985	4,985
New Units Affected by Scenario	0	0	150	1,099	1,099
Above Average \$ Value	0	0	43	296	296
Average \$ Value	0	0	71	519	519
Below Average \$ Value	0	0	36	284	284
Units Displaced from County by Scenario (	0	0	0	0	0
Above Average \$ Value	0	0	0	0	0
Average \$ Value	0	0	0	0	0
Below Average \$ Value	0	0	0	0	0
OTHER INPUTS:					
Value per Unit (1990 \$) (6)					
Above Average \$ Value	\$65,700	\$65,700	\$65,700	\$65,700	\$65,700
Average \$ Value	\$44,800	\$44,800	\$44,800	\$44,800	\$44,800
Below Average \$ Value	\$15,050	\$15,050	\$15,050	\$15,050	\$15,050
Analysis Period (Years)	19	19	19	19	19
Average Household Size Per Unit (2010) (	2.66	2.66	2.66	2.66	2.66
Real Property Tax Rate (Per \$100) (1990)	\$0.870	\$0.870	\$0.870	\$0.870	\$0.870
Commercial Property Factor (8)					
Above Average \$	115%	115%	115%	115%	115%
Average \$	116%	116%	116%	116%	116%
Below Average \$	117%	117%	117%	117%	117%
1990 Population (Actual)	22,856	22,856	22,856	22,856	22,856
New Population (1990-2010) (9)	4,673	4,673	4,673	4,673	4,673
New Households (1990-2010) (10)	2,418	2,418	2,418	2,418	2,418
Summary:	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Acres Available	102,607	102,607	102,607	102,607	102,607
Acres in Use	10,998	10,998	10,998	10,998	10,998
Acres of Demand	2,531	2,531	2,531	2,531	2,531
Acres Affected	0	0	3,200	4,985	4,985
Acres left for Development	89,078	89,078	85,878	84,093	84,093
Units of Demand	2,587	2,587	2,587	2,587	2,587
Value of Demand Units	\$96,849,900	\$96,849,900	\$96,849,900	\$96,849,900	\$96,849,900
New Units Affected	0	0	150	1,099	1,099
Percent of Demand Affected	0.0%	0.0%	5.8%	42.5%	42.5%
Value of Affected Units	\$0	\$0	\$6,547,700	\$46,972,600	\$46,972,600
New Units Displaced	0	0	0	0	0
Value of Displaced Units	\$0	\$0	\$0	\$0	\$0
New Households Displaced	0	0	0	0	0
Displaced Population	0	0	0	0	0
Annual Revenues	\$2,154,396	\$2,154,396	\$2,154,396	\$2,154,396	\$2,154,396
Annual Expenditures	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274
Cash Flow	(\$4,878)	(\$4,878)	(\$4,878)	(\$4,878)	(\$4,878)
Change (from baseline case) (11)	\$0	\$0	\$0	\$0	\$0



**PROJECTED GROWTH: (28)**

Fiscal Year	1988	1989	1990
-------------	------	------	------

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
2010	2010	2010	2010	2010
4,873	4,873	4,873	4,873	4,873
748	748	748	748	748
2,418	2,418	2,418	2,418	2,418
102,807	102,807	102,807	102,807	102,807
2,687	2,687	2,687	2,687	2,687
2,631	2,631	2,631	2,631	2,631
0	0	3,200	4,886	4,886
0	0	160	1,088	1,088
0	0	0	0	0
\$96,849,900	\$96,849,900	\$96,849,900	\$96,849,900	\$96,849,900
\$112,148,867	\$112,148,867	\$112,148,867	\$112,148,867	\$112,148,867

### Direct Residential Development

**Total Value of New Development (Residential Only) (11)**  
**Total Value of New Development (Residential and Commercial) (12)**

### PROJECTED GROWTH:

**D-4-5**

# FISCAL IMPACT ANALYSIS OF COMPATIBLE LAND USE ALTERNATIVES

NEW OPERATING EXPENDITURES	FISCAL YEAR					SCENARIO				
	1988	1989	1990	Actual	Actual	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
EXPENDITURES:										
Local Funds for Education (21)										
Per Household \$	\$193	\$159	\$157			\$175 \$423,160	\$175 \$423,160	\$175 \$423,160	\$175 \$423,160	\$175 \$423,160
Debt Service (22)	\$0	\$37	\$47			\$42 \$101,556	\$42 \$101,556	\$42 \$101,556	\$42 \$101,556	\$42 \$101,556
Human Services (23)										
Per Household \$	\$271	\$297	\$326			\$318 \$765,924	\$318 \$765,924	\$318 \$765,924	\$318 \$765,924	\$318 \$765,924
General Government (24)										
Per Household \$	\$106	\$131	\$107			\$120 \$290,160	\$120 \$290,160	\$120 \$290,160	\$120 \$290,160	\$120 \$290,160
Public Safety (25)										
Per Household \$	\$147	\$164	\$167			\$163 \$394,134	\$163 \$394,134	\$163 \$394,134	\$163 \$394,134	\$163 \$394,134
Other (26)										
Per Household \$	\$65	\$76	\$70			\$75 \$181,350	\$75 \$181,350	\$75 \$181,350	\$75 \$181,350	\$75 \$181,350
TOTAL EXPENDITURES:				Total:	Cash Flow:	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274	\$2,159,274
						(64,878)	(64,878)	(64,878)	(64,878)	(64,878)

NOKE COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

Fiscal Year	1988		1989		1990		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	Actual		Actual		Actual		Most Likely	4.873	Most Likely	4.873	Most Likely	4.873	Most Likely	4.873	Most Likely	4.873
DEMOGRAPHIC DATA																
Demand Assumption:																
Population		21,842		22,399		22,856	Most Likely	4.873	Most Likely	4.873	Most Likely	4.873	Most Likely	4.873	Most Likely	4.873
Population Growth (20-year)							20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%
REVENUES: (27)																
Property Tax	\$2,939,488		\$2,846,505		\$3,174,985		\$1,033,555		\$1,033,555		\$1,033,555		\$1,033,555		\$1,033,555	
Real Property	\$2,419,199		\$2,342,874		\$2,813,013		\$878,126		\$878,126		\$878,126		\$878,126		\$878,126	
Other Property	\$520,289		\$503,631		\$361,972		\$155,428		\$155,428		\$155,428		\$155,428		\$155,428	
Sales Tax	\$1,590,816		\$1,158,638		\$1,181,487		\$291,467		\$291,467		\$291,467		\$291,467		\$291,467	
Other Tax	\$302,382		\$111,924		\$235,899		\$74,858		\$74,858		\$74,858		\$74,858		\$74,858	
Sales & Service	\$38,433		\$66,752		\$106,838		\$24,180		\$24,180		\$24,180		\$24,180		\$24,180	
Intergovernmental	\$1,737,846		\$2,231,430		\$2,281,248		\$623,844		\$623,844		\$623,844		\$623,844		\$623,844	
Miscellaneous	\$3,785,732		\$360,227		\$376,310		\$106,392		\$106,392		\$106,392		\$106,392		\$106,392	
Total:	\$10,404,767		\$6,775,477		\$7,467,578		\$2,154,396		\$2,154,396		\$2,154,396		\$2,154,396		\$2,154,396	
EXPENDITURES: (27)																
Local Funds for Education	\$1,507,350		\$1,342,779		\$1,353,278		\$423,150		\$423,150		\$423,150		\$423,150		\$423,150	
Debt Service	\$0		\$307,625		\$400,078		\$101,558		\$101,558		\$101,558		\$101,558		\$101,558	
Human Services	\$2,338,608		\$2,502,766		\$2,788,883		\$768,824		\$768,824		\$768,824		\$768,824		\$768,824	
General Government	\$866,208		\$1,103,243		\$918,544		\$280,160		\$280,160		\$280,160		\$280,160		\$280,160	
Public Safety	\$1,209,828		\$1,377,244		\$1,347,668		\$394,134		\$394,134		\$394,134		\$394,134		\$394,134	
Other	\$534,078		\$640,158		\$598,687		\$181,350		\$181,350		\$181,350		\$181,350		\$181,350	
Total:	\$6,355,878		\$7,273,815		\$7,407,836		\$2,159,274		\$2,159,274		\$2,159,274		\$2,159,274		\$2,159,274	
Operating Cash Flow:	\$4,048,921		(\$498,338)		\$59,742		(\$4,878)		(\$4,878)		(\$4,878)		(\$4,878)		(\$4,878)	

## **FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES FOR HOKE COUNTY**

*(These model notes are numbered to correspond with note numbers on the fiscal impact analysis model outputs for this county.)*

**1. Demand Assumption** – The demand assumption defines the projected level of population and housing growth for all growth scenarios. The most likely level of growth is defined as the level of growth projected from the North Carolina State estimates. The high- and low-growth scenarios assume a growth level 15 percent above and below the state estimate.

**2. Existing Housing Supply** – Values in this category define current land use in the county. Total developable land is estimated from U.S. Geological Survey maps and county data. That number excludes the infrastructure associated with existing housing, including roads and streets, public lands, schools and other public facilities, commercial uses, and areas of land not suitable for construction because of topographical limitations. Existing housing units are estimated from 1990 Census data. Existing acreage in use is estimated from current housing densities and includes land for the infrastructure.

**3. Projected Housing Supply** – Values in this category define future housing demand based on projected population growth and include new units required for housing replacement. The market value of new units is defined for above-average, average, and below-average price based on 1990 Census data.

**4. Affected Housing Supply** – Values in this category identify the number of housing units, by value, and total net acreage that falls under the noise zones, low-level overflight zones, and height-restricted areas defined for each scenario of land use restrictions. This does not include existing units.

**5. Units Displaced from County** – Units displaced are the number of affected housing units, by value, that are estimated to be lost from the county if land use restrictions are imposed. It is assumed that dislocations would take place: (1) where land use restrictions on density would lower the amount of developable land to the point where the county could not absorb the level of projected growth or

(2) where a specific parcel of land is considered sufficiently unique (e.g., a lake or resort area) that if land use was restricted, at least some of the demand for the area would be relocated outside the county.

**6. Value per Housing Unit** – The values per housing unit in the above-average, average, and below-average price ranges are from 1990 Census data.

**7. Average Household Size per Unit** – The average household size per unit is projected based on 1990 Census data and projections of household size for the year 2010.

**8. Commercial Property Factor** – This value is used to estimate the commercial property value associated with new housing units. For example, a new house of above-average value is assumed to have an additional 15 percent of commercial property value associated with it. Therefore, the addition of each unit that sells for, say, \$100,000 would generate \$115,000 in combined residential and commercial property value.

**9. New Population (1990 through 2010)** – The total new population for the years 1990 through 2010 is based on estimates from the State of North Carolina.

**10. New Households (1990 through 2010)** – The number of new households for this period is based on state population projections and adjusted for average household size by census tract.

**11. Change in Operating Cash Flow (from the baseline case)** – This value indicates the net fiscal change (revenues minus expenditures) to the county operating budget associated with each land-use scenario compared with the cash flow in the baseline condition where no land-use restrictions are applied.

**12. Total Value of New Development (residential and commercial)** – The total value of new development includes the value of new housing units projected for the county, by market value, and it is adjusted to include the commercial property value associated with residential growth.

**13. Real Property Tax** – Revenues in this category are projected based on the value of real property development for the years 1990 through 2010 multiplied by the county's 1990 real property tax rate. Real property is assumed to be assessed at 92 percent of market value.

**14. Sales Tax** – Revenues in this category are projected based on FY90 historical rates for nonmilitary households adjusted to 1990 dollars. This value is estimated based on the expected sales tax generated from above-average, average, and below-average price housing units. It is assumed that all county growth will be in nonmilitary households.

**16., 18.** – Revenues in these categories are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**17., 19.** – Revenues in these categories are projected based on FY89 and FY90 historical per household rates adjusted to 1990 dollars.

**20. Total Revenues** – Total revenues are the projected revenues generated from new real property and new households for the years 1990 through 2010, for each scenario of land use restrictions.

**21., 24., 25.** – Expenditures in these categories are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**22., 26.** – Expenditures in these categories are projected based on FY89 and FY90 per household historical rates adjusted to 1990 dollars.

**23. Human Services** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars. It is assumed that all county growth will be in nonmilitary households.

**27. Revenue and Expenditure Forecasts** – The forecasted fiscal flows from the FIA are based on projected county growth for the years 1990 through 2010, adjusted to 1990 dollars, as affected by each land use scenario.

**28. Projected Growth** – Projected growth is based on North Carolina State estimates for the county for the years 1990 through 2010. These growth estimates are provided for high-, low-, and most likely growth scenarios as noted in the "demand assumption" line on the first page of the FIA model (Scenario Input Table).

**ANNEX D-5**

**FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES  
FOR MOORE COUNTY**



**MOORE COUNTY**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<b>SCENARIO INPUT TABLE</b>					
Analysis Period (year)	2010	2010	2010	2010	2010
<b>DEMAND ASSUMPTION (1)</b> (High, Most Likely, or Low)	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%	Most Likely 100%
<b>EXISTING: (2)</b>					
Total Net Acres	375,832	375,832	375,832	375,832	375,832
Existing Units	27,358	27,358	27,358	27,358	27,358
Acres in use	24,655	24,655	24,655	24,655	24,655
<b>PROJECTED: (3)</b>					
Units Required to meet Demand	7,809	7,809	7,809	7,809	7,809
Above Average \$ Value	2,634	2,634	2,634	2,634	2,634
Average \$ Value	3,402	3,402	3,402	3,402	3,402
Below Average \$ Value	1,773	1,773	1,773	1,773	1,773
Acres Required to meet Demand	9,326	9,326	9,326	9,326	9,326
<b>AFFECTED: (4)</b>					
Acres Affected by Scenario	0	0	9,529	9,529	9,529
New Units Affected by Scenario	0	0	1,847	1,847	1,847
Above Average \$ Value	0	0	500	500	500
Average \$ Value	0	0	469	469	469
Below Average \$ Value	0	0	878	878	878
Units Displaced from County by Scenario (5)	0	0	915	915	915
Above Average \$ Value	0	0	250	250	250
Average \$ Value	0	0	219	219	219
Below Average \$ Value	0	0	446	446	446
<b>OTHER INPUTS:</b>					
Value per Unit (1990 \$) (6)					
Above Average \$ Value	\$134,200	\$134,200	\$134,200	\$134,200	\$134,200
Average \$ Value	\$80,300	\$80,300	\$80,300	\$80,300	\$80,300
Below Average \$ Value	\$23,200	\$23,200	\$23,200	\$23,200	\$23,200
Analysis Period (Years)	19	19	19	19	19
Average Household Size Per Unit (2010) (7)	2.25	2.25	2.25	2.25	2.25
Real Property Tax Rate (per \$100) (1990)	\$0.420	\$0.420	\$0.420	\$0.420	\$0.420
Commercial Property Factor (8)					
Above Average \$ Value	115%	115%	115%	115%	115%
Average \$ Value	116%	116%	116%	116%	116%
Below Average \$ Value	117%	117%	117%	117%	117%
1990 Population (Actual)	59,013	59,013	59,013	59,013	59,013
New Population (1990-2010) (9)	12,343	12,343	12,343	12,343	12,343
New Households (1990-2010) (10)	7,298	7,298	7,298	7,298	7,298
<b>Summary:</b>	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>	<b>Scenario 5</b>
Acres Available	375,832	375,832	375,832	375,832	375,832
Acres in Use	24,655	24,655	24,655	24,655	24,655
Acres of Demand	9,326	9,326	9,326	9,326	9,326
Acres Affected	0	0	9,529	9,529	9,529
Acres left for Development	341,851	341,851	332,322	332,322	332,322
Units of Demand	7,809	7,809	7,809	7,809	7,809
Value of Demand Units	\$667,797,000	\$667,797,000	\$667,797,000	\$667,797,000	\$667,797,000
New Units Affected	0	0	1,847	1,847	1,847
Percent of Demand Affected	0.0%	0.0%	23.7%	23.7%	23.7%
Value of Affected Units	\$0	\$0	\$125,130,300	\$125,130,300	\$125,130,300
New Units Displaced	0	0	915	915	915
Value of Displaced Units	\$0	\$0	\$61,482,900	\$61,482,900	\$61,482,900
New Households Displaced	0	0	915	915	915
Displaced Population	0	0	2,059	2,059	2,059
Annual Revenues	\$8,818,821	\$8,818,821	\$7,885,549	\$7,885,549	\$7,885,549
Annual Expenditures	\$8,531,362	\$8,531,362	\$7,461,727	\$7,461,727	\$7,461,727
Cash Flow	\$287,459	\$287,459	\$423,822	\$423,822	\$423,822
Change (From Baseline case) (11)	\$0	\$0	\$136,362	\$138,362	\$136,362

MOORE COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

	Fiscal Year				Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
					2010		2010		2010		2010		2010	
	1988	1989	1990											
<b>ECONOMIC IMPACTS:</b>														
Population (8)	66,652	67,833	68,013		12,343	12,343	12,343	12,343	10,284	10,284	10,284	10,284	10,284	10,284
School Children (Estimated at 18%)	8,064	8,253	8,442		1,876	1,876	1,876	1,876	1,646	1,646	1,646	1,646	1,646	1,646
Households (10)					7,288	7,288	7,288	7,288	6,383	6,383	6,383	6,383	6,383	6,383
<b>DEVELOPMENT IMPACTS</b>														
Direct Residential Development														
Total Net Acres					376,832	376,832	376,832	376,832	376,832	376,832	376,832	376,832	376,832	376,832
Units Required to meet Demand (3)					7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808
Acres Required to meet Demand					9,328	9,328	9,328	9,328	8,328	8,328	8,328	8,328	8,328	8,328
Acres Affected by Scenario (4)					0	0	0	0	0	0	0	0	0	0
Units Affected by Scenario (4)					0	0	0	0	0	0	0	0	0	0
Units Displaced by Adopting Zoning (6)					0	0	0	0	1,847	1,847	1,847	1,847	1,847	1,847
					0	0	0	0	816	816	816	816	816	816
Total Value of New Development (Residential Only) (11)					\$667,787,000	\$667,787,000	\$667,787,000	\$667,787,000	\$608,314,100	\$608,314,100	\$608,314,100	\$608,314,100	\$608,314,100	\$608,314,100
Total Value of New Development (Residential and Commercial) (12)					\$771,521,028	\$771,521,028	\$771,521,028	\$771,521,028	\$700,432,892	\$700,432,892	\$700,432,892	\$700,432,892	\$700,432,892	\$700,432,892

MOORE COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

NEW OPERATING REVENUES

FISCAL YEAR	PROJECTED GROWTH: (28)				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
1988	1990	1990	1990	1990	1990
Actual	Actual	Actual	Actual	Actual	Actual
66,662	66,662	66,662	66,662	66,662	66,662
1980 Population	69,013	69,013	69,013	69,013	69,013
New Population (1980-2010) (8)	12,343	12,343	10,284	10,284	10,284
New Households (1980-2010) (10)	7,288	7,288	6,383	6,383	6,383
New Housing Units (1980-2010) (9)	7,808	7,808	6,884	6,884	6,884
Total Population (2010)	71,356	71,356	69,287	69,287	69,287
Population Growth (20-year)	20.82%	20.82%	17.43%	17.43%	17.43%
REVENUES:					
Property Tax					
Real Property (13)	\$3,432,643	\$3,432,643	\$3,116,288	\$3,116,288	\$3,116,288
Other Property (14)	\$2,916,348	\$2,916,348	\$2,647,836	\$2,647,836	\$2,647,836
Sales Tax (15)	\$516,194	\$516,194	\$468,832	\$468,832	\$468,832
Per Household \$					
Per Household \$ (Above Average)	\$340	\$340	\$340	\$340	\$340
Per Household \$ (Average)	\$227	\$227	\$227	\$227	\$227
Per Household \$ (Below Average)	\$72	\$72	\$72	\$72	\$72
Other Tax (16)	\$1,785,682	\$1,785,682	\$1,628,846	\$1,628,846	\$1,628,846
Per Household \$	\$80	\$80	\$80	\$80	\$80
Sales & Service (17)	\$656,820	\$656,820	\$574,470	\$574,470	\$574,470
Per Household \$	\$80	\$80	\$80	\$80	\$80
Intergovernmental (18)	\$437,880	\$437,880	\$382,880	\$382,880	\$382,880
Per Household \$	\$108	\$108	\$108	\$108	\$108
Miscellaneous (19)	\$1,226,084	\$1,226,084	\$1,072,344	\$1,072,344	\$1,072,344
Per Household \$	\$174	\$174	\$174	\$174	\$174
Total Revenue: (20)	\$1,289,862	\$1,289,862	\$1,110,642	\$1,110,642	\$1,110,642
Revenue: (Excluding Real Property Taxes)	\$5,902,472	\$5,902,472	\$5,237,912	\$5,237,912	\$5,237,912
Real Property Taxes:	\$2,916,348	\$2,916,348	\$2,647,836	\$2,647,836	\$2,647,836
Total:	\$8,818,821	\$8,818,821	\$7,885,748	\$7,885,748	\$7,885,748



MOORE COUNTY  
FISCAL IMPACT ANALYSIS  
OF COMPATIBLE LAND USE  
ALTERNATIVES

PROJECTED GROWTH: (28)

Fiscal Year	1988		1989		1990		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	Actual		Actual		Actual		Meet Likely	20.9%	Meet Likely	20.9%	Meet Likely	17.4%	Meet Likely	17.4%	Meet Likely	17.4%
DEMOGRAPHIC DATA																
Demand Assumption:																
Population																
Population Growth (20-year)																
REVENUES: (27)																
Property Tax	\$10,274,016		\$10,554,864		\$11,228,040		\$3,432,543		\$3,432,543		\$3,116,268		\$3,116,268		\$3,116,268	
Rail Property	\$8,485,516		\$8,888,653		\$9,241,500		\$2,916,348		\$2,916,348		\$2,647,638		\$2,647,638		\$2,647,638	
Other Property	\$1,819,601		\$1,888,211		\$1,997,640		\$516,184		\$516,184		\$468,832		\$468,832		\$468,832	
Sales Tax	\$5,088,868		\$5,608,888		\$6,087,833		\$1,785,862		\$1,785,862		\$1,628,845		\$1,628,845		\$1,628,845	
Other Tax	\$2,088,919		\$2,288,038		\$2,244,340		\$666,820		\$666,820		\$574,470		\$574,470		\$574,470	
Sales & Service	\$1,421,218		\$1,375,905		\$1,897,387		\$437,880		\$437,880		\$382,980		\$382,980		\$382,980	
Intergovernmental	\$3,217,819		\$3,585,328		\$4,984,684		\$1,226,084		\$1,226,084		\$1,072,344		\$1,072,344		\$1,072,344	
Miscellaneous	\$8,237,039		\$5,874,885		\$2,828,084		\$1,289,852		\$1,289,852		\$1,110,842		\$1,110,842		\$1,110,842	
Total:	\$28,306,667		\$28,284,430		\$28,072,360		\$8,818,821		\$8,818,821		\$7,885,549		\$7,885,549		\$7,885,549	
EXPENDITURES: (27)																
Local Funds for Education	\$13,193,267		\$8,330,513		\$9,101,820		\$3,072,458		\$3,072,458		\$2,887,243		\$2,887,243		\$2,887,243	
Debt Service	\$1,478,666		\$1,813,629		\$2,338,271		\$681,946		\$681,946		\$481,481		\$481,481		\$481,481	
Human Services	\$3,503,083		\$4,828,218		\$4,414,471		\$1,288,852		\$1,288,852		\$1,110,842		\$1,110,842		\$1,110,842	
General Government	\$2,787,050		\$2,517,301		\$4,024,983		\$819,548		\$819,548		\$804,268		\$804,268		\$804,268	
Public Safety	\$2,087,243		\$2,163,083		\$3,148,083		\$768,992		\$768,992		\$683,832		\$683,832		\$683,832	
Other	\$4,876,050		\$8,757,878		\$6,039,284		\$1,849,566		\$1,849,566		\$1,704,281		\$1,704,281		\$1,704,281	
Total:	\$27,873,368		\$28,600,818		\$28,087,832		\$8,531,362		\$8,531,362		\$7,461,727		\$7,461,727		\$7,461,727	
Operating Cash Flow:	\$432,499		\$683,612		\$4,418		\$287,459		\$287,459		\$423,822		\$423,822		\$423,822	

## **FISCAL IMPACT ANALYSIS MODEL OUTPUTS AND NOTES FOR MOORE COUNTY**

*(These model notes are numbered to correspond with note numbers on the fiscal impact analysis model outputs for this county.)*

**1. Demand Assumption** – The demand assumption defines the projected level of population and housing growth for all growth scenarios. The most likely level of growth is defined as the level of growth projected from the North Carolina State estimates. The high- and low-growth scenarios assume a growth level 15 percent above and below the state estimate.

**2. Existing Housing Supply** – Values in this category define current land use in the county. Total developable land is estimated from U.S. Geological Survey maps and county data. That number excludes the infrastructure associated with existing housing, including roads and streets, public lands, schools and other public facilities, commercial uses, and areas of land not suitable for construction because of topographical limitations. Existing housing units are estimated from 1990 Census data. Existing acreage in use is estimated from current housing densities and includes land for the infrastructure.

**3. Projected Housing Supply** – Values in this category define future housing demand based on projected population growth and include new units required for housing replacement. The market value of new units is defined for above-average, average, and below-average price based on 1990 Census data.

**4. Affected Housing Supply** – Values in this category identify the number of housing units, by value, and total net acreage that falls under the noise zones, low-level overflight zones, and height-restricted areas defined for each scenario of land use restrictions. This does not include existing units.

**5. Units Displaced from County** – Units displaced are the number of affected housing units, by value, that are estimated to be lost from the county if land use restrictions are imposed. It is assumed that dislocations would take place: (1) where land use restrictions on density would lower the amount of developable land to the point where the county could not absorb the level of projected growth or

(2) where a specific parcel of land is considered sufficiently unique (e.g., a lake or resort area) that if land use was restricted, at least some of the demand for the area would be relocated outside the county.

**6. Value per Housing Unit** – The values per housing unit in the above-average, average, and below-average price ranges are from 1990 Census data.

**7. Average Household Size per Unit** – The average household size per unit is projected based on 1990 Census data and projections of household size for the year 2010.

**8. Commercial Property Factor** – This value is used to estimate the commercial property value associated with new housing units. For example, a new house of above-average value is assumed to have an additional 15 percent of commercial property value associated with it. Therefore, the addition of each unit that sells for, say, \$100,000 would generate \$115,000 in combined residential and commercial property value.

**9. New Population (1990 through 2010)** – The total new population for the years 1990 through 2010 is based on estimates from the State of North Carolina.

**10. New Households (1990 through 2010)** – The number of new households for this period is based on state population projections and is adjusted for average household size by census tract.

**11. Change in Operating Cash Flow (from the baseline case)** – This value indicates the net fiscal change (revenues minus expenditures) to the county operating budget associated with each land-use scenario compared with the cash flow in the baseline condition where no land-use restrictions are applied.

**12. Total Value of New Development (residential and commercial)** – The total value of new development includes the value of new housing units projected for the county, by market value, and it is adjusted to include the commercial property value associated with residential growth.

**13. Real Property Tax** – Revenues in this category are projected based on the value of real property development for the years 1990 through 2010 multiplied by the county's 1990 real property tax rate. Real property is assumed to be assessed at 92 percent of market value.

**14. Sales Tax** – Revenues in this category are projected based on FY90 historical rates for nonmilitary households adjusted to 1990 dollars. This value is estimated based on the expected sales tax generated from above-average, average, and below-average price housing units. It is assumed that all county growth will be in nonmilitary households.

**16. Other Tax** – Revenues in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**17., 18., 19.** – Revenues in these categories are projected based on FY89 and FY90 per household historical rates adjusted to 1990 dollars.

**20. Total Revenues** – Total revenues are the projected revenues generated from new real property and new households for the years 1990 through 2010, for each scenario of land use restrictions.

**21., 22., 24., 26.** – Expenditures in these categories are projected based on FY88, FY89 and FY90 per household historical rates adjusted to 1990 dollars. These expenditures do not include state funds.

**25. Public Safety** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars.

**23. Human Services** – Expenditures in this category are projected based on FY88, FY89, and FY90 per household historical rates adjusted to 1990 dollars. It is assumed that all county growth will be in nonmilitary households.

**27. Revenue and Expenditure Forecasts** – The forecasted fiscal flows from the FIA are based on projected county growth for the years 1990 through 2010, adjusted to 1990 dollars, as affected by each land use scenario.

**28. Projected Growth** – Projected growth is based on North Carolina State estimates for the county for the years 1990 through 2010. These growth estimates are provided for high-, low-, and most likely growth scenarios as noted in the "demand assumption" line on the first page of the FIA model (Scenario Input Table).



# REPORT DOCUMENTATION PAGE

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4. TITLE AND SUBTITLE <i>The Impacts of Compatible Land Use at Fort Bragg – Pope Air Force Base</i>			5. FUNDING NUMBERS C MDA903-90-C-0006 PE 0902198D	
6. AUTHOR(S) Bob Hutchinson, Tom Muller, Debi Goldstone, Bill Moore				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Logistics Management Institute 6400 Goldsboro Road Bethesda, MD 20817-5886			8. PERFORMING ORGANIZATION REPORT NUMBER LMI-FP106R1	
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11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT A: Approved for public release; distribution unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) Fort Bragg and Pope Air Force Base (AFB) form a major military complex that dominates the Fayetteville, N.C., region. Together, the bases constitute a significant portion of the regional economy, directly accounting for nearly one out of every four jobs, and generating about 21 percent of regional earnings. In recent years, there has been increased local public interest in the noise and safety impacts that these training exercises can have on local communities in the vicinity of the bases. In 1989, a joint land use task force of local government officials, DoD representatives, and local citizens was formed to address the noise and safety issues in the Fort Bragg area. In 1991, the task force issued a <i>Joint Compatible Land Use Policy Study</i> . Building on this study, the Logistics Management Institute (LMI) examined the fiscal implications associated with compatible land use for the four counties in the area that are most affected by Fort Bragg's military operations: Cumberland, Harnett, Hoke, and Moore. The fiscal impacts of adopting compatible land uses are negligible largely because the substantial amounts of land are available for development outside of the areas affected by proposed restrictions. Local jurisdictions have the ability to direct intensive development away from areas affected by military operations without incurring any significant costs. However, military authorities do not have the same flexibility. In most cases, military operations cannot be moved from their existing training sites without incurring additional costs. If some degree of compatible land use is not adopted in the four counties under study, then future land development is likely to alter military operations and could ultimately threaten the viability of Fort Bragg – Pope AFB as a major training and "force-projection" complex.				
14. SUBJECT TERMS Compatible land use			15. NUMBER OF PAGES 127	
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